Growing Up Healthily
SECOND REVISED EDITION

YOUR HEALTH AND GROWTH SERIES

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FOREWORD TO THE TEACHER

In the days when subjects followed conventional patterns, it was an easy matter to write textbooks. The authors attempted to make the content as simple as they could and expected the children to master what was set before them. But the subject matter itself was completely prescribed by the specialists who worked in the field.

More recently the problems of textbook authors have greatly increased in complexity. Accepting the current theory of education that the content of textbooks and courses of study should be based upon the needs and interests of children, they must radically change the old conventional subject matter. Consideration has been given to what the children need, in what grades it will be of the most interest to children, how the information can be translated into habits, the degree of difficulty of the vocabulary, and a score of other considerations.

Consequently in the preparation of the *Health and Growth Series,* of which the present books are a revision, exhaustive basic studies of a wide variety were carried on over an extended period of time:

Statistics concerning the incidence of children's diseases and accidents were collected and interpreted to provide an indication of the school age at which materials upon these subjects should be most appropriately taught. Health columns in newspapers and health bulletins for laymen were analyzed to discover the vocabulary children should be taught to enable them to continue to read intelligently popular health articles after graduation and in adult life. The difficulty of words was ascertained for each grade to enable the authors to use words known by eighty per cent of the class, except necessary technical terms, which would be carefully explained.

The initial purpose of this series is to interest the child in living healthfully. The primary method of creating this interest is to teach a unit when the learner sees a good reason for its introduction—precautions when colds

are in season, safety in the "accident years" of childhood. Supplementary methods are legion. They include of course illustrations that depict real health situations.

A second objective is to establish specific, flexible habits of healthful living. What one *does* is of more importance than what one *knows*. Good health is maintained by actions and not by knowledge alone. To acquire flexible habits of right living, no time is so opportune as the period of childhood. All methods of habit building should be used—interest in the activity, an understanding of its physiological purpose, repetition until essential daily routines are established, use in varied situations, and satisfaction in the outcome. The mental hygiene and the social aspects are given special emphasis.

A third objective of major importance is to furnish the child with the latest scientific information about health and disease. Much misinformation is still prevalent in the homes of the nation. This can be eradicated in the next generation only provided that the child learns proved facts in the schoolroom. Much can be eradicated in the homes of this generation by the practice of having the child read his texts with his parents.

In preparing the first thoroughly revised and completely reorganized edition, the *New Health and Growth Series* the authors considered the health subjects for which there was increasing need in our schools. Believing that the interest in safety education should be utilized and that the subject should be taught in the elementary school grades as units in many courses at appropriate points rather than in added independent courses, the authors included a generous amount of information about the methods of assuring safety from accidents and about the reasonableness of the rules presented.

In sympathy with the attention that was belatedly being given conservation and consumer education by the schools and believing, as in the case of safety education, that these desirable fields should be treated in the elementary grades as units of already existing courses, the authors devoted substantial space to conservation as ap-

plied to health and endeavored to teach the children to become skillful in getting the best for their money and their effort in matters of health and its accessories—food, clothing, vacations, recreations, medicines.

During war years, health knowledge advances rapidly. This was true in World War II. Especially in the fields of nutrition and disease prevention and control, important discoveries were made. Among these were the newer knowledge of the vitamins, the sulfa drugs, the medicinal molds—penicillin and streptomycin—and DDT and related preparations for combating insect pests. These subjects and other recently reported health knowledge are now incorporated in *Your Health and Growth Series*. In the present revision improvements have also been made along these lines: (1) the organization of content, (2) the further simplification of vocabulary and sentence structure, (3) the emphasis on the most pressing postwar health needs and on the solution of local health problems, and (4) the recognition of social and vocational motives for healthful living and the importance of each pupil's taking more responsibility for his own health and for the health of others.

The authors are indebted to many sources for the materials which they examined in their search for scientific and practical materials. Particularly they acknowledge the use of data from the writings of the National Safety Council, the American Red Cross, and the study of accidents of school children made by Miss Jeanie M. Pinckney, Chief of the Bureau of Nutrition and Health Education, Division of Extension, University of Texas. Special acknowledgment is made to Mrs. Helene Searcy Puls for her valuable assistance with the third to the eight books, inclusive, and to Miss Leslie Hunt and Mrs. George MacLeod for contributions to the ninth book.

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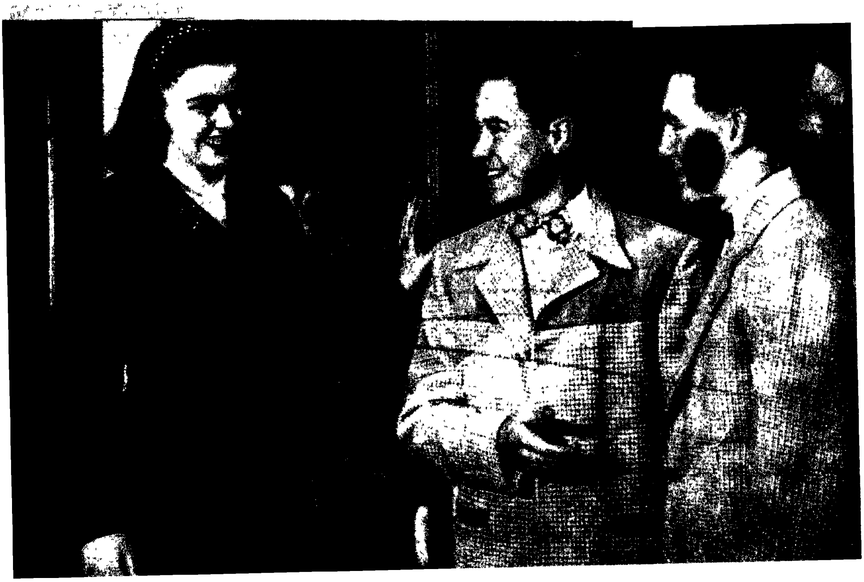
UNIT IX. Safety

UNIT I

THE ADVENTURE OF GROWING UP

Bob was almost as tall as his father. He was growing up fast. He said, "I have more responsibilities now. When my father is away I'm in charge, next to my mother. It's up to me to go to bed on time and get up on time. It's up to me to do my homework and not loaf. I take care of my brother, too, whenever he goes anywhere with me." Bob was growing up in many ways.

Growing up began when you were a baby. You have already passed through childhood. Now you are in your teens, or will be soon. This is an in-between time of life. You have one hand reaching back to childhood and the other hand reaching forward toward the grown-up world. Sometimes you feel and act like a child; at other times you feel and act like a grown up. How can you learn to handle your mixed feelings?



WHAT IT MEANS TO GROW UP

Growing up can be a happy adventure.. Whether it is or not depends partly on how you feel about it.

Paul likes the idea of growing up. He said, "I feel that I am more grown up this year because I travel alone, cross the street safely, and know much more than I used to. To me, it feels good to be growing up. Each year I am given more privileges. Each year I can understand better the words grown-ups use. When I grow up, I will have still more privileges. I am looking forward to a happy life."

Patricia also is looking forward to growing up. She said, "I feel that it's a wonderful thing to grow up. As you grow up, you take on more responsibilities. I want to grow up so that I can buy my own clothes and earn my own money and later have my own family and home. When I get a little older, I'd like to travel to many places."

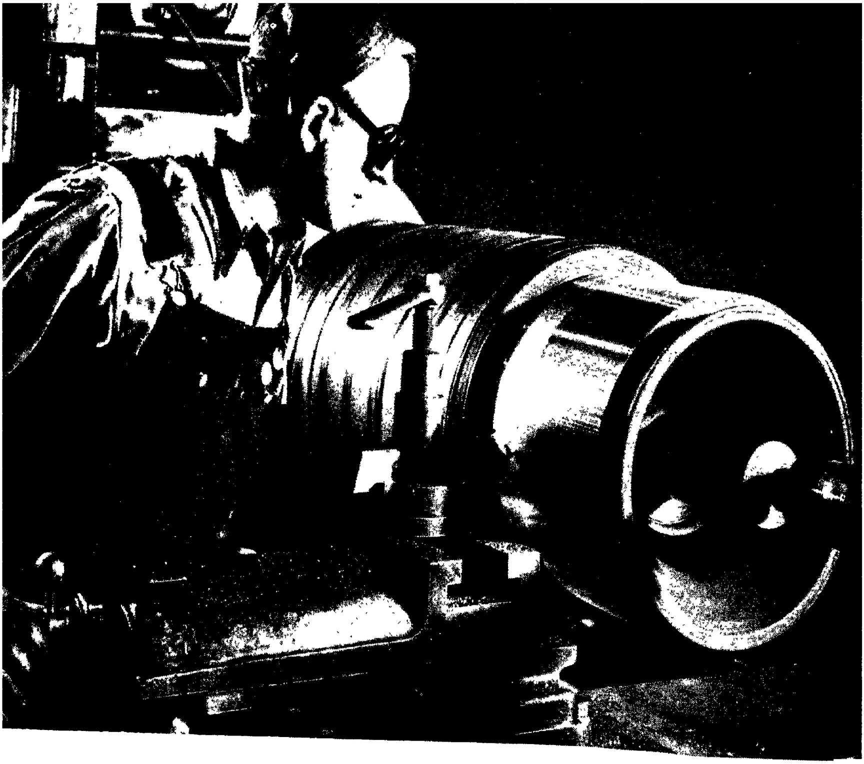
Ted feels that he is not growing up fast enough. "When I think of people at work, I say they are very lucky. That's why I want to grow up—so I can go to work. I want to go into the air force and make a career of it."

Bob seems to be a little reluctant to grow up; he isn't sure whether he likes the idea or not. He has noticed that life is not "one grand, sweet song" for everyone—that some people seem to have more than their share of trouble. He enjoys his school work and his out-of-school activities and looks forward to going on into high school with his "crowd." But there are times when he dreads growing up and assuming the responsibilities of an adult.

How do you feel about growing up?

What do you need to do a certain job well?

The unskilled worker needs to be physically fit for his



kind of job. He needs to understand any dangers to health in his job and guard against them.

The skilled worker should have training for doing his job safely and well. He should keep his tools in good condition. He should dress properly and do all the safe things needed to run a particular machine. He should know how to protect himself from heat and glare or poisons, *chemicals*,* [1] or chemical dusts.

Like all workers, he should have regular *health examinations.** He should have rest periods when necessary, and he should get enough sleep. He should know what is a good lunch for him to eat and how to get it.

[1] Starred words are explained in the glossary at the end of this book.

The farmer needs to learn the kinds of crops for which his land is best and how to use it without wearing it out or spoiling it for future years. He should use his land to provide good food for his family as well as to raise food for sale.

The farmer has special problems of getting safe water and safe milk.

He should be able to guard against the many kinds of farm accidents—from farm animals, falls from ladders and trees, strains, and *sprains,** careless use of gasoline and kerosene, sunstroke, heatstroke, improper use of axes, knives, and other farm tools, and dangerous or unskillful use of farm machinery.

The airplane pilot, stewardess, and other members of the crew must be physically fit for the job. They may have

to get used to flying high or low. Smoking a lot, drinking *alcoholic** beverages, or overeating makes a flier less able to stay high up above the clouds. He may have trouble in breathing, feel the cold more, and not see clearly enough.

Mary Jane said, "I want to grow up so that I can help people when they are in trouble. I want to be a nurse when I grow older." To enter a school of nursing you must have a good high-school record and two years of science. You should like people and be alert and responsible. You should have no serious physical defects or any other defects that can be corrected. Your health must be good.

To be a teacher you must know your subject, of course. But the teacher should also know his pupils and enjoy being with them. He needs good health to be fit to teach.

Some teen-agers don't want to grow up. They are afraid of having to take many responsibilities.

Some want to get the most out of each year of life. As Don said, "Growing up is all right. But it's good to live and be happy while you can." Yes, to get the most out of each year as it passes—one must plan and work to stay happy.

THE EARLY YEARS

EDWARD'S HEALTH HISTORY

Have you ever tried to write the story of your life? One seventh-grade class did. It helped them to understand themselves better. Here is one of the health histories. It was written by Edward when he was thirteen.

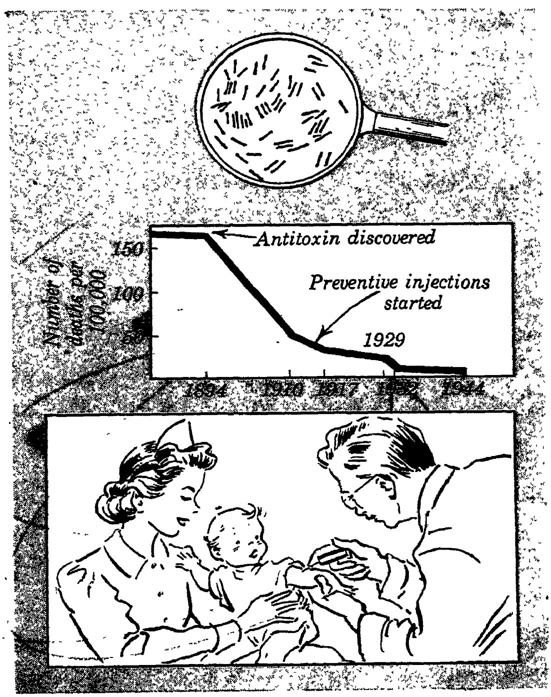
"I was born a healthy child. I weighed nine pounds.

"I am told that I was a very quiet baby and hardly cried at all. I suppose my first word was 'mama' or 'dada.' But my first word I remember saying was 'mulk' (which means *milk*). I used to sit in my high chair and bang my cup (which was plastic) on the tray, yelling 'Mulk, mulk!' My mother would fill the cup and I would drink all that I didn't spill.

"When I was seven months old, I was protected against diphtheria. When I was eleven months, I was *vaccinated* * for *smallpox.**

"I had a few colds between two and four years, but all in all I was getting along pretty well.

PROTECT THE BABY AGAINST DIPHTHERIA



Diphtheria is a very dangerous disease. It is caused by germs that get into a child's nose and throat.

But—see how deaths from diphtheria have decreased.

Your family doctor or the doctor at a health center will give the baby the *toxoid** and other *injections** that will protect him. Take him when he is three months old. All children need this protection.

"When I was six, I got *scarlet fever.** I had a fairly mild case, but I could have done very well without it.

"At about the age of seven and a half I got the *whooping cough.** I had it for only about two weeks. That was a pest of a disease!

"Between the ages of eight and ten, like most children, I got *chicken pox* * and *measles.** When I had chicken pox I itched all over. I was very uncomfortable. But when I had the measles, I couldn't read and I couldn't even do puzzles.

"Since then I've had no more diseases.

"From the time I was a little baby until now I always find something to do around bedtime. It is listening to the radio, reading, doing homework, or playing my cello. It took a long time, but at last I would begin to get ready to go to bed. Now I get to bed early—on the nights when there are no detective programs on the radio. When I get into bed it is—well, it should be nine o'clock. When I get up in the morning, that is a different matter. But by a miracle I manage to get up at seven o'clock.

"I eat a healthful breakfast of orange juice or grapefruit, a cereal, milk, and toast. That lasts me until lunch, and usually I can hardly wait for it.

"So you see I have grown up to be a pretty healthy person, and I hope to continue that way all my life."

This boy, now in his early teens, had a health history like that of many other children. He was protected against two serious diseases when he was a baby. When he began to go to school, he caught most of the so-called children's diseases. Perhaps the reason why he had such a mild case of scarlet fever was that the doctor had given him toxoid. Although chicken pox and measles were un-

comfortable for him, he can be glad he had mild cases of them. They might be much more serious when he is older. For example, German measles may be very serious for mothers who are going to have a baby.

The years from nine to twelve are usually the healthiest years in one's whole life. Like Edward, many children say, "I am big and healthy now, though I wasn't when I was younger."

Some children grow fast; some are slow growers. Janet grew fast. She had always been a little taller than the other girls of her age. Her mother and father were both tall. The chances were that she would be tall, too.

When she was ten, she began to grow still faster. That year she gained two inches in height. Most of her friends were still little girls. She was tall and thin. They gave her the nickname "Bones."

The next year she began to gain weight. She gained twenty pounds that year. She felt much more grown up than her friends. The things they were doing did not interest her now. Her interest had changed. Her friends left her out of their plans and she was unhappy. She did not know what to do about it.

Janet would have been happier if:

. . . She had said, "I guess I'm a fast grower. The others will catch up with me later. I don't need to worry about that now."

. . . She had thought of the advantages of growing up fast.

. . . She had learned to play and enjoy games and sports which the older children were playing.

. . . She had looked forward to the time when she would be a woman and have a home and family of her own to care for.

Ray was a fast grower, too. But he had "parent trouble." "My parents don't realize I'm growing up," he said. "They have the idea that I'm not old enough to decide anything for myself. I hate to be treated like a kid.

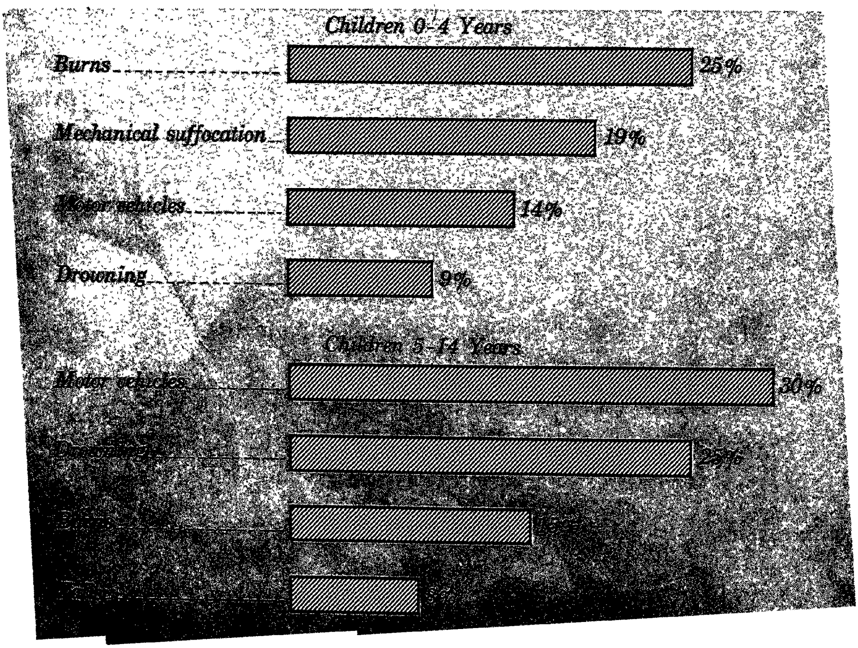
"I want to buy my own clothes, make my own plans, choose my own friends. I want to be independent.

"Oh, I don't mean I wish my parents were not around at all. I think parents *should* know where we are in the evening. They should be just strict enough. Parents come in handy at times. I want to ask them what they think, and then make up my own mind."

The early years are important. They are the foundation for health and happiness later on.

ACCIDENTS IN CHILDHOOD

Accidents kill more children than any one disease. These are the most common accidents among children:

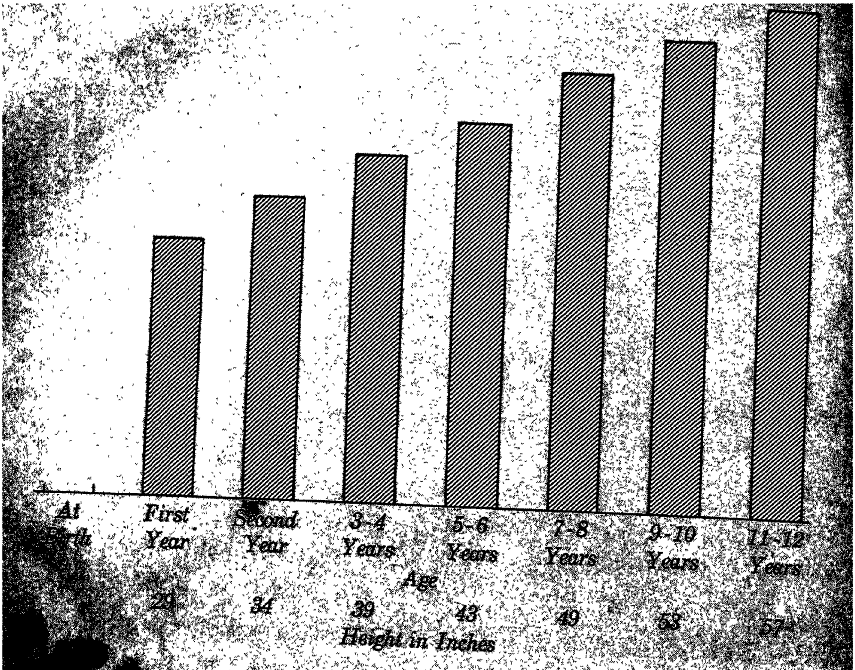


HELPING LITTLE CHILDREN TO GROW UP RIGHT

Now you are leaving your childhood behind you. But other children are growing up. You can help them to grow up right. The next pages will tell you how.

Boys may say when they begin to read these pages: "This is just for girls. We are not interested in babies. Caring for babies is girls' work." But they will soon see that big brothers are very important to little brothers and sisters. There are many good turns that older boys can do every day if they have younger brothers and sisters.

Boys and girls in the upper grades of school do not always understand how much influence they have on their younger brothers and sisters. The future health and happiness of the baby may depend upon the way he is treated during the first years of life. You can be an in-



AVERAGE HEIGHTS OF CHILDREN

fluence for good on the baby and small children in your family in at least four ways: (1) by helping your mother take care of the baby and small children so that she will have more time to rest; (2) by knowing what to do for them in case your mother has to be away from home for a short time; (3) by not making a noise or trying to play with the baby when he should be sleeping; and (4) by staying away from babies and young children when you have a communicable disease.

Some schools have clubs for girls called Little Mothers' Leagues. At the club meetings a nurse or home-economics teacher shows the club members the best way to bathe the baby, the kind of clothing he should wear,

and the kind of food he should have. They learn other ways to help with the care of the baby and children not old enough to go to school. In a few schools boys learn the proper care of babies and young children, too.

Some older boys and girls earn money by taking care of the neighbors' children for an hour or two when the mother has to be away or is busy with other things. Many college girls earn money to go to college in this way. Some people's lifework is the care of young children.

To take care of babies and small children you need to know: (1) how to treat them during the day, (2) what to feed them, and (3) how to prevent them from having accidents. Here are a few suggestions.

1. *What to do when the baby cries.* If the baby cries, there's a reason. Try to find out what it is. He may have a pin sticking in him. He may be wet and uncomfortable. He may be coming down with some disease. Notice whether he has a running nose or the beginning of a red rash on the skin. Notice whether his face is cold and pale or hot and red. Sometimes he just wants attention, and he has already discovered that crying brings mother, father, sister, or brother running to him.

When you have found the reason for his crying, you will know what to do. If he is crying because he is uncomfortable, you can make him comfortable easily enough. If he is crying because he is sick, you can get a doctor. If he is crying because he wants attention, you can try giving him attention before he begins to cry. Some people pay attention to children only when they do not behave well. Good children like to get attention, too. Babies need love as much as they need food.

2. *What to do when a little child says, "No."* A two-

or three-year-old child often says, "No," or, "I won't," to everything you ask him to do. This is a part of his learning to grow up. First be sure that what you ask him to do is something he can do and should do. Speak slowly and clearly, using words that he knows. Try to fit what you want him to do with what he wants to do. Even a small child likes to share in making plans. For example, if he is playing with his toy bear and you want him to come to supper, you can say, "Teddy wants his supper; bring him along with you to supper," instead of saying, "Stop playing and come to supper." Some teen-age boys and girls put themselves in a little child's place and see his world as he sees it. They do not have any trouble in making children mind.

3. *What to do when a child kicks and screams.* Sometimes a child has learned to get what he wants by fussing or kicking and screaming. If he has, then he must be taught better ways of getting what he wants and needs. Be sure that he does not get what he wants by being disagreeable. Show him better ways of acting. And make it pleasant for him when he is good.

4. *What to do when a child is afraid.* If a little child has become afraid of the dark, of dogs, of water, or of other things, you can help him overcome his fear. The best way to do this is let him do something about it. If he learns how to make a room dark or light by turning the light off or on, he may lose his fear of the dark. If he has a puppy to feed and play with, he may lose his fear of dogs. If he has a little boat to sail on the water, he may lose his fear of the water. Of course you should never frighten a small child by telling him that the policeman or the bogieman will get him if he isn't good.

5. *What should you give little children to play with?* The year-old baby likes bright-colored balls and birds and dolls made of cloth or wood. He likes sets of pans and boxes that fit one into another. Books with pages that will not tear are the best for him. He likes large pegs to fit into the holes in a board. He likes to be taken where he will see new sights and hear new sounds.

The two-year-old likes all kinds of natural playthings —flowers, pet animals, trees. Animals that he can watch are better than animals that he can handle, because it is hard to keep animals really clean. The two-year-old also likes little wagons that he can pull. He likes to play in the sand. Indoors he likes dolls and dolls' furniture, crayons, blocks, and picture books.

Children three and four years old like big boxes of all sizes, swings, seesaws, wagons, kiddie cars, and balls.

Some of the toys children like best cost very little money. If you give little children suitable playthings, you will not have much trouble in taking care of them. You may even read or study while you are with them.

6. *How long should the baby sleep?* The newborn baby sleeps about twenty out of the twenty-four hours. Between the ages of one and two years thirteen to fifteen hours are best. Children from two to four years old should have twelve to fourteen hours' sleep, and children from four to six years old eleven to thirteen hours' sleep. Nine to ten and one half hours of sleep are best for most boys and girls of your age.

Help the little children you know to get as much quiet sleep as they need. The baby's bedroom should be dark and quiet and have fresh, clean air moving gently through it. Does your bedroom have these good points?

7. *What should you give the baby to eat?* If you have a doctor who tells your mother what to give the baby to eat, all you have to do is to obey the doctor's orders and see that the baby has his meals on time.

Milk is the foundation of the baby's diet. By the end of the first year strained vegetables, baked potato, egg yolk, chopped liver and other kinds of meat, fish-liver oil, orange juice, applesauce, and toast should have been added, in very small amounts at first.

In the second year the baby should be given these same foods in larger amounts. In the third and fourth years his meals are very much like yours.

These are meals that are good for a small child:

BREAKFAST

Orange juice and fish-liver oil
Cereal with milk
Toast and butter
Milk to drink

DINNER

Baked potato
Finely chopped green vegetable
Small piece of liver
Bread and butter
Milk pudding
Milk to drink

AFTERNOON LUNCH

Milk
Graham * crackers

SUPPER

Cereal and milk
Milk to drink
Bread and butter
Stewed fruit, such as applesauce or pears, or mashed banana

If milk and vegetables have always been served in an attractive form when the baby was feeling happy, the

chances are that he will eat willingly these wholesome foods. If, however, the child has learned to dislike any of these foods, you will have to be patient in helping him to overcome the dislike.

Milk need not always be served as milk to drink. Some children who do not like plain milk take it willingly when it is made into a cereal pudding or custard or flavored with a little cocoa or fruit juice. If a child does not like green vegetables, do not force him to eat them every day cooked in the same old way. One day chop the vegetable very fine and make it into a milk soup. Another day serve it chopped, buttered, and sprinkled with hard-cooked egg yolk. Another day put some lemon juice on it. Never say you do not like any of the wholesome foods. Little children are quick to imitate older members of the family.

If you are taking care of small children, do not allow anyone to give them sweets between meals. Sweets will take away their appetite for the vegetables and milk they should have at mealtime. If your little brothers or sisters refuse to eat at mealtime, let them go hungry until the next meal.

If you go to the zoo, you will see a sign that says, "Do not feed the animals." The keeper of one zoo was asked why that rule was made. He said, "We used to have a great many *digestive* * disorders among the animals as a result of overfeeding by visitors; but by forbidding people to feed the animals and by giving each animal the amount of food it needs, we keep the animals healthy." Certainly we should take as good care of small children as the keepers do of the animals that are in the zoo.

IF A SMALL CHILD HAS SWALLOWED A SAFETY PIN, THE *X-ray* * PICTURE HELPS THE DOCTOR FIND IT.

8. *How can you protect the baby from illness?* Before they are a year old, babies should be protected against whooping cough by *vaccine* * and against diphtheria and *tetanus* by toxoid. At the age of one year they should be protected against smallpox by vaccine. Persons with colds and other communicable diseases should keep away from other people. But some do not. You may have to say to some people with colds: "Please don't go near the baby. He catches cold so easily, and he feels so miserable when he has a cold." Colds often lead to other, more serious illnesses.

9. *How to protect small children from accidents.* A two- or three-year-old likes to look at and handle things. The wise big brother or sister who is minding the baby will try to see that there is nothing near by that will

harm the baby. If the baby has safe toys—balls, blocks, cups, pans, a little wagon, picture books, or sand—to play with, he is not likely to have accidents.

Some of the things that may be dangerous are kettles with hot liquid near the edge of the stove, sink, or table; tubs or boilers of hot water on the floor; matches; small objects, such as coins, seeds, tacks, buttons, marbles, jacks, pebbles, pins, and the like, which the baby might put in his mouth and perhaps swallow or choke on; toys that have small parts which the child might pull off, such as a toy animal with button eyes not fastened tightly or beads on a string that might break; objects with sharp points or edges, such as scissors, knives, or razors; foods that have seeds, pits, shells, or stems; pointed sticks, bows and arrows, guns; an opened tin can with sharp edges; bits of broken glass or china; a lamp or other heavy object on a tablecloth that a child might pull off; poisonous substances, such as *iodine.**

Using this list as a check list, you can in five minutes be sure that none of these kinds of things are within reach of the baby.

At the same time a big brother or sister can gradually teach the baby to use some of these objects in a safe way. For example, a year-and-a-half-old baby can be taught to bring any pins he finds directly to his sister. Every time he does so, sister should smile and otherwise show her approval. The baby's hand can be held very near the iron or the coffeepot so that he will know how disagreeably hot it is and avoid touching it. Some boys and girls have fun teaching the baby habits of safety. And doing so is well worth all the time and patience it takes.

Last year you made a good start on using problem-solving methods. Do you remember the steps?

1. State the problem clearly and tell why it is important.
2. Think of possible ways of solving it.
3. Select the best ways.
4. Try them out to see if they work.

You can use this same method in solving your teen-age problems. Use it on these problems of growing up.

1. *If you are a little afraid of growing up and taking on more responsibilities.* Why are your feelings about growing up important? What are the best ways to feel about growing up? What privileges would you like to have? What responsibilities go with these privileges?

2. *What is your growth pattern? How can you learn to accept it?* Was there a time when you did not grow much? Then did you suddenly grow taller? After that, did you make big gains in weight, and then begin growing more slowly again?

3. *If you are a fast grower, how should you feel about it? What should you do?*

4. *If you are a slow grower, how should you feel about it? What should you do?*

5. *If you disagree with your parents.* Suppose they treat you like a baby, what is the best thing to do? Suppose they put too much responsibility on you all at once, what can you do?

6. *When you feel lazy and want to skip studying, how can you "snap out of it"?*

7. *If something worries you, what can you do instead of worrying?* Have you an older brother or sister with whom you can discuss your problem? Or talk it over with a teacher and get the benefit of his experience.

8. Be ready to tell in class about accidents that have happened to small children you have known. Tell in class the ways in which these accidents might have been prevented. What dangerous things should be put out of the reach of small children in the house or yard?

9. Have you thought about what you would like to do when you grow up? Is it a kind of work that will help you and other people have better health?

10. Read one of the books listed on page 23 and tell the class what you have learned.

Discussion Questions

Irene, who has written the following statements, would like to teach in a nursery school when she grows up. Do you think she has learned all this book tells so far? If you think any statement is wrong, write it in your health notebook the way you think it should be. (Do not write in this book.)

1. The way a baby is treated is important to his future health and happiness.
2. You should pay no attention to a baby when he cries.
3. Make it pleasanter for a small child to be good than to be naughty.
4. Kittens and puppies are good pets for the baby.
5. Babies should get used to sleeping anywhere.
6. You should train a child to drink milk and eat vegetables.
7. The most common accident for children under five is burns.
8. Children's toys must be safe and clean.
9. Children should be protected against whooping cough and diphtheria before they are a year old.
10. Homemaking is one of the most important jobs.

LEARNING FROM ONE ANOTHER

Interesting Pamphlets and Books[1]

Bethers—*Perhaps I'll Be a Farmer*
De Schweinitz—*Growing Up*
Ets—*The Story of a Baby*
Evans—*People Are Important*
Flander—*Baby-Sitters' Handbook*
Keliher—*Picture Fact Books*
Kitson—*I Find My Vocation*
Metropolitan Life Insurance Company—*Understanding Your Young Child*
Remmers—*What Are Your Problems?*
Strain—*Being Born*
Strang—*A Study of Young Children*
U. S. Office of Education—*Bill Gets the Works*

THE TEEN AGE

You slide from childhood into the teen age, or *adolescence,** almost before you know it. This is an exciting age, when you change from a child to an adult. Let us see what changes in growth and health take place during the teens.

HOW DO YOU GROW?

In your class are there some boys and girls who still look like children? They have not yet had the spurt of growth which comes sooner or later. Are there others who have grown so big they could almost pass for men and women? They have come almost to the end of their spurt of growth. Are there more big girls than big boys of the same age in your class? That is because girls grow up almost two years earlier than boys. The boys

[1] A complete list of reference books will be found in the appendix.

catch up with them later and in the end become taller and heavier than girls.

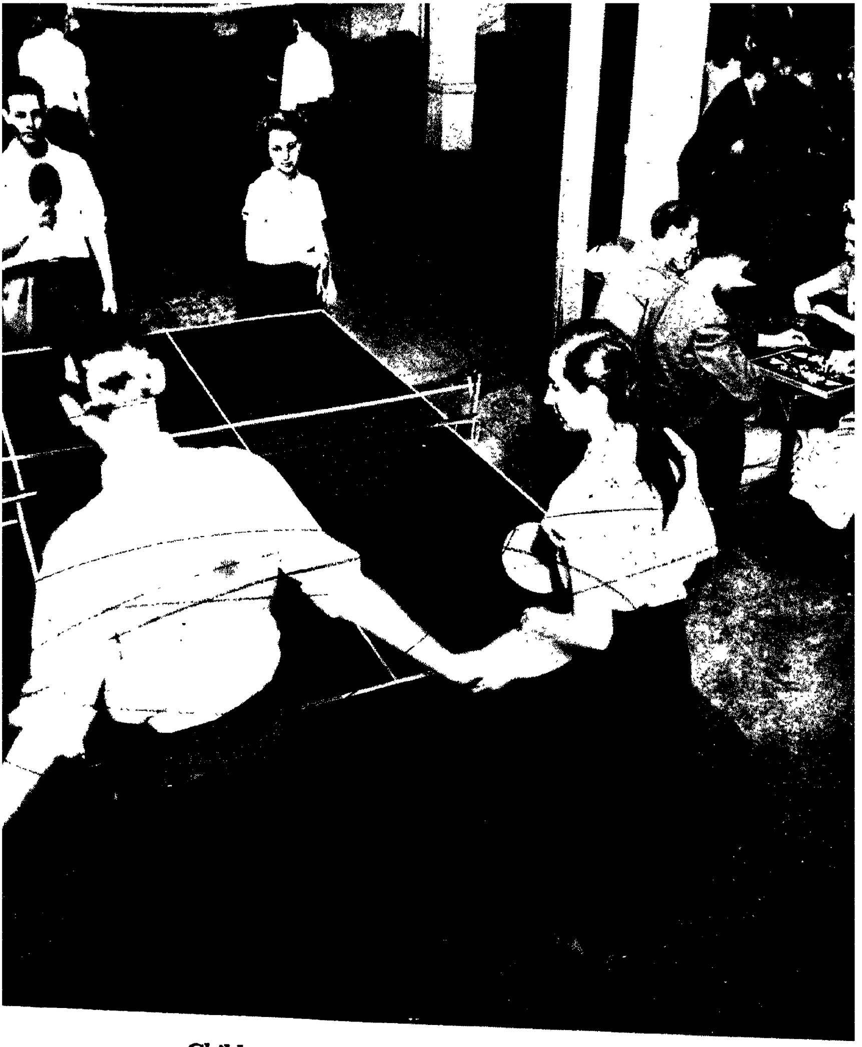
By twelve years of age many girls have done their most rapid growing. From twelve to fifteen they may gain one to two inches each year. By sixteen or seventeen years of age many have reached their full height. Boys twelve to fifteen years old grow two to three inches each year. Some may grow almost a foot during these three years.

If you have suddenly become much taller than your friends of the same age, do not worry about it. They will probably begin to grow more quickly soon and you will no longer feel different. If you stay about the same height, while your friends shoot up above you, do not worry. Your spurt of growth will probably come later.

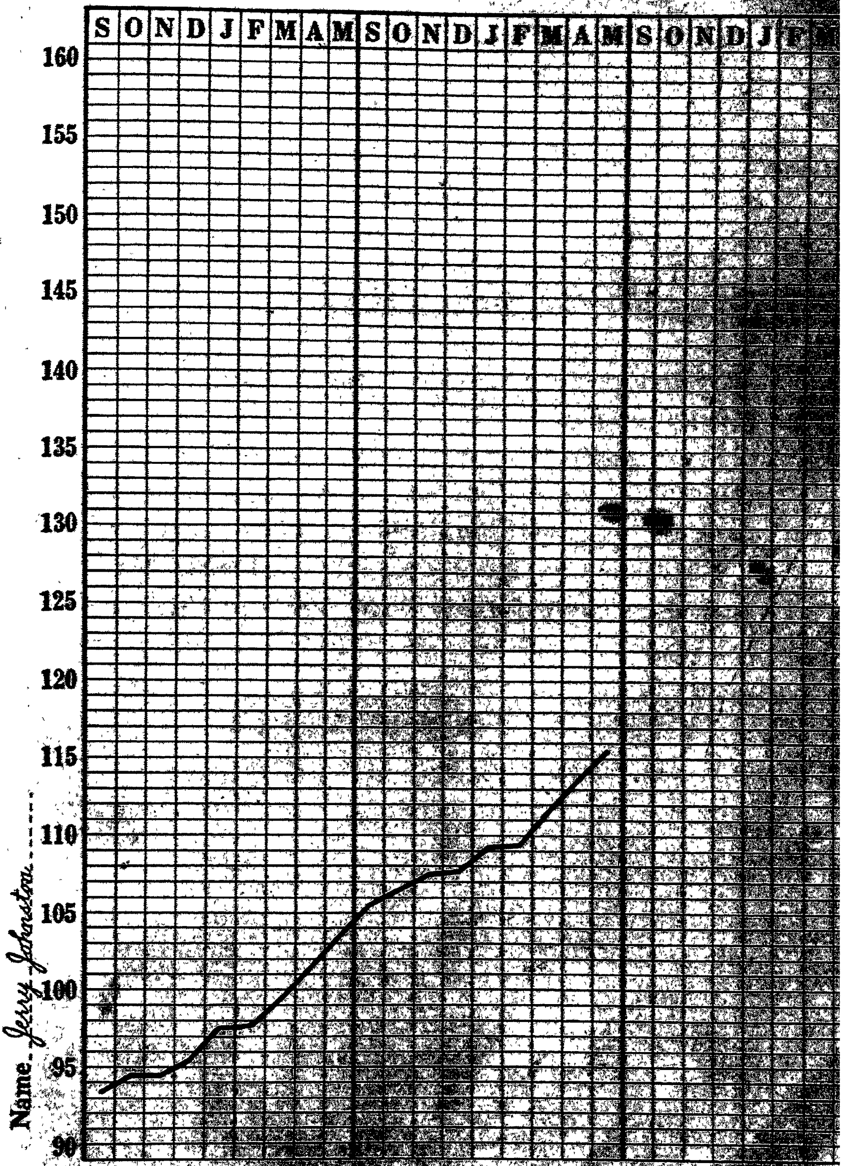
It is interesting to watch your height and weight during these years. On page 25 is one boy's weight graph. Jerry was thirteen years old when he began to keep his weight record. Then he weighed a little over ninety-three pounds. He weighed himself carefully in the same kind of clothes each month. The *S* at the top of the graph stands for *September, O* for *October,* and so on for the other months of the school year. Jerry had grown slowly when he was eleven and twelve years old. Now, at thirteen, he began to gain in height and weight. Boys often gain eight to sixteen pounds a year during the seventh, eighth, and ninth grades. Girls now may gain more slowly. Most of them have had their growth spurt earlier.

TEEN-AGE DANGERS

At the bottom of page 26 you see three teen-age dangers. Accidents are the No. 1 killer of young people. In one year during World War II the main causes of

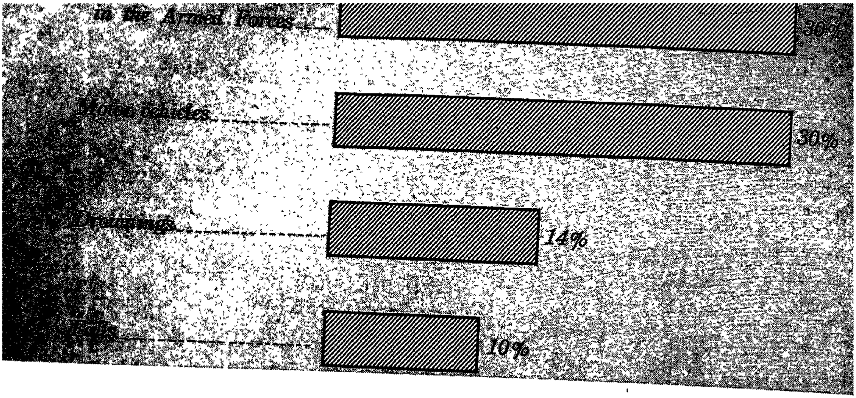


Children and adults meet and enjoy games together.



A GOOD WEIGHT GRAPH

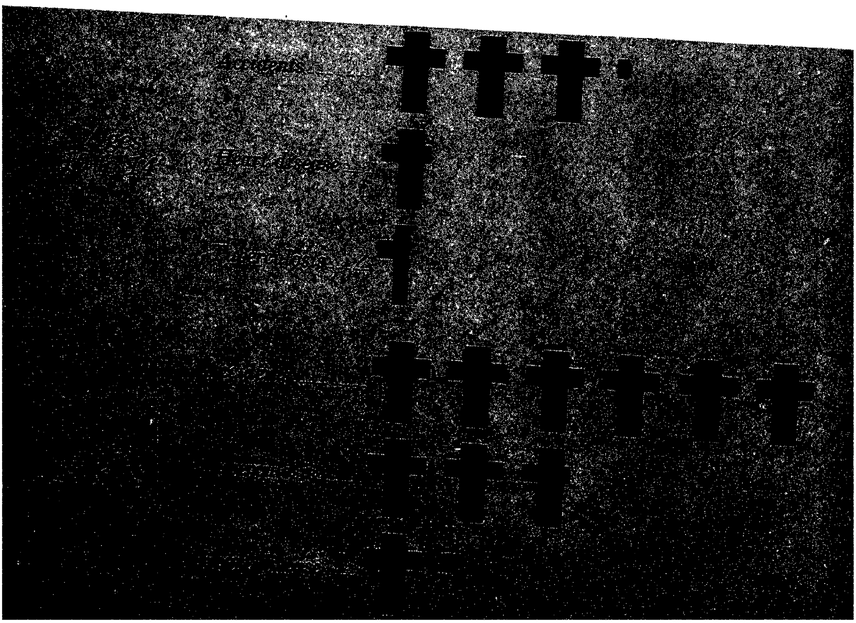
How many pounds did Jerry gain the first year? The second year?



accidental death in the older teen-age and young adult group (15-24 years) were those shown above.

When there is no war, motor vehicles lead as the cause of accidents in the teens. Drowning and falls are also dangers throughout the second ten years of life.

If you want to know right away how to decrease these teen-age dangers, turn to pages 189-207, 213-215, and 237-273.



There is another side of growing up. It is knowing how to make friends, how to work and play happily with others, how to face facts, and how to overcome difficulties. You are taking tests on these points from the time you get up in the morning until you go to bed at night. Perhaps it will help you to see how other teen-age boys and girls have met them.

1. *How to make friends.* When Jane went to a new school, she was lonely for her old friends. The boys and girls in the new school already had their own special friends. They spoke to her of course, but they did not ask her to do things with them.

Jane was shy, but she followed her mother's advice. Her mother had said, "Find out the interests of the boys and girls in your class. Find something that each one does very well." Jane asked one girl about her beautiful Indian bracelet. That question led to an afternoon looking at pictures of Mexico and a real friendship. She asked a boy how he had learned to draw so well. He was pleased that she had noticed his drawing and brought some of his pictures to her house. This brought her another friend. She asked another girl to teach her to play kickball. Before long she had a place on the team. In a short time Jane had learned at least one interest of everyone in her class and was fast becoming popular.

"The boys and girls in my grade are *all* interesting," she told her mother. Her mother said, "Perhaps the secret is in your being interested in them."

There is a story about a stranger who was traveling through a new country. He met a person who had lived

in that place for a long time. You may have heard of such an *old-timer.*

"Old-timer," said the stranger, "what kind of folk live here?"

"What kind of folk lived in the country you came from, friend?" asked the old-timer.

"Oh, they were mean, disagreeable, quarrelsome people," said the stranger.

"I reckon you'll find the same kind of people here," said the old-timer.

Another stranger met the old-timer.

"Old-timer," he said, "what kind of folk live here?"

"What kind of folk lived in the country you came from, friend?" asked the old-timer.

"Oh, they were kind, friendly, agreeable people," said the stranger.

"I reckon you'll find the same kind of people here," said the old-timer.

Do you think the two strangers found the same kind of folk in the new country that they had found in their former homes? Why?

There are adventures in friendships. For most of us there is nothing so interesting as people. Every person you meet lives in a world you will never quite know. People who come from other countries can tell you exciting stories of the trip here and how strange this American life seemed to them. Perhaps in your class there is someone who came from another country. Ask him to tell you how your school and play look to him. Older people are interesting, too. Ask your grandparents to tell you what they did when they were your age. What did they do when there were no movies to see, when

there was no radio to listen to? How did they feel when they saw an airplane for the first time? That much-loved writer Will Rogers said, "I've never met a man I didn't like."

The interesting person is the one who has learned to see the small adventures of his everyday life. He can tell about them so that other people enjoy listening to him. Perhaps you have read a story and said, "Why, those people are just like people I know." You may have enjoyed story people more than real people because the writer knew how to make them seem more interesting. You expect a story to be interesting. Why not expect living to be fun? Although you may not want to be a writer, you can find interesting little stories to tell. They will help you to write good compositions and to talk well.

Often boys and girls ask how they may learn to be good talkers. If you begin now to notice the small adventures of your own life, you will always have something interesting to talk about. You will be good company. While you are learning to tell stories, remember to be a good listener, too.

Hobbies bring friends. Persons who like to play outdoor games, collect stamps, paint, sing, do folk dances, make things out of wood, leather, or cloth, or learn about birds, flowers, or stars naturally get together. They sometimes form clubs or teams. For example, the members of 4-H clubs have fun and practical adventures that help them learn how to make their farms and homes better places in which to live. Your school clubs help you to build new interests and to make new friends.

Some boys and girls play and talk only with their own small crowd. Naturally you enjoy your own friends, but

TOGETHER BRINGS FRIENDS.

get acquainted with other people as well. To do so adds interests and good adventures to your life.

2. *How to work and play happily with others.* Did you ever hear of an "infectious smile"? Perhaps a smile is the most catching thing in the world. When pleasant words or acts go with a smile, happiness spreads out in all directions just as the round waves spread out from a stone tossed into a lake. How fast and how far these waves spread you may never know. Surely you can remember a day when you felt rather "low." Then somebody stopped you to praise something you had done well. You felt warm inside. Soon you said something nice to another person you met, perhaps a boy or girl who had just started going to your school. You played games with him after school, heard about his other school and his friends. At dinner you were happy and full of news and plans. Your whole family was interested and happy also. Next day you went to school feeling well pleased with your world. Probably you had forgotten about the friendly words that started all this.

You can make a game of getting along with other people. The game might have such rules as: pass on any happiness that is given you just as you would pass a ball; every time you are hurt or annoyed, say something nice to the next person you are with. That is the best way to stop the spread of meanness "germs." You know very well how fast they can be spread.

Dick stopped the spread of meanness "germs" when a boy called him a coward because he would not walk home across the railroad bridge. Although Dick felt angry, he said nothing. When he met another boy, he said, "I wish I could bat the way you do." That bit of

praise led to two hours of fun playing ball in a vacant lot. Next day the first boy said, "You have a mind of your own, Dick, and there's nothing mean about you."

If you have gone a long way toward being grown up, you will not strike back when someone has hurt you. Instead, you may try to straighten things out by talking the matter over. If talking does not help, you will try to find out what makes him act that way. You will even try to figure out how you can help him to become a "regular fellow."

3. *How to face facts and overcome difficulties.* Sometimes a person gets in a kind of trap. He wants to get out but does not know just how. He may try first one way and then another. Some ways are good; some are bad. The good ways learned early lead to a happy life.

Let us think of the bad ways first so that we shall not use them as ways out of a trap situation. Bad ways are:

1. To blame someone else for your difficulty
2. To find excuses
3. To give up and stop trying
4. To think you're no good and will never amount to anything
5. To say, "I didn't want that anyway"—the sour-grapes story
6. To sulk and be disagreeable
7. To try to get what you want by cheating

The good ways are just as easy to learn. There are two main ways, which Mother Goose has described:

> "For every evil under the sun
> There is a remedy or there is none.
> If there be one, go and find it.
> If there be none, never mind it."

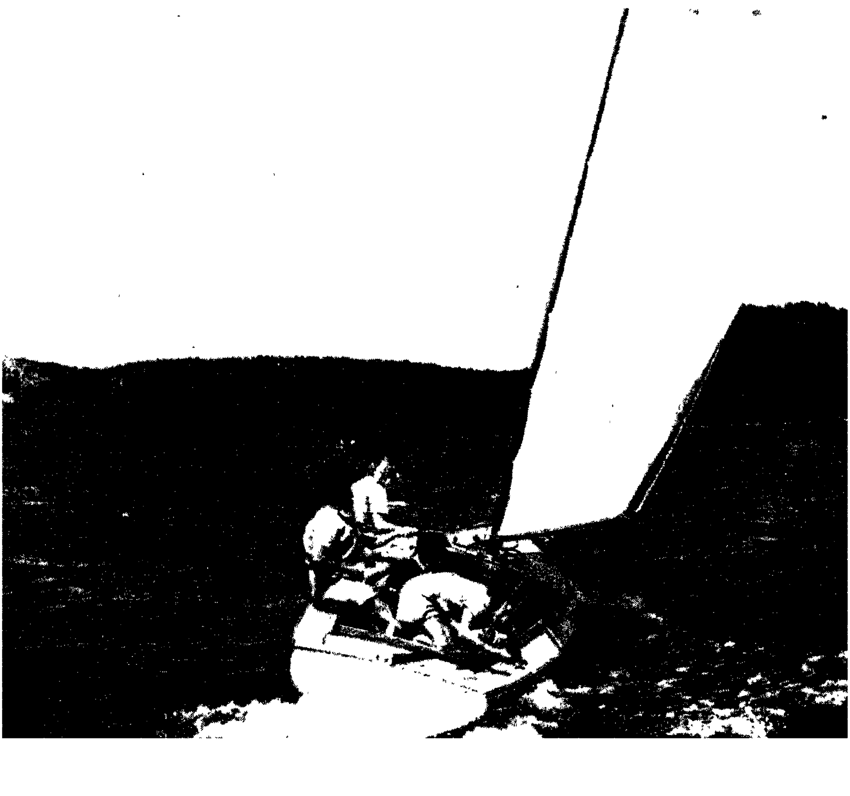
You can learn what to do to meet the difficulty, or you can change the way you feel about it. These two main ways may be divided into these things to do:

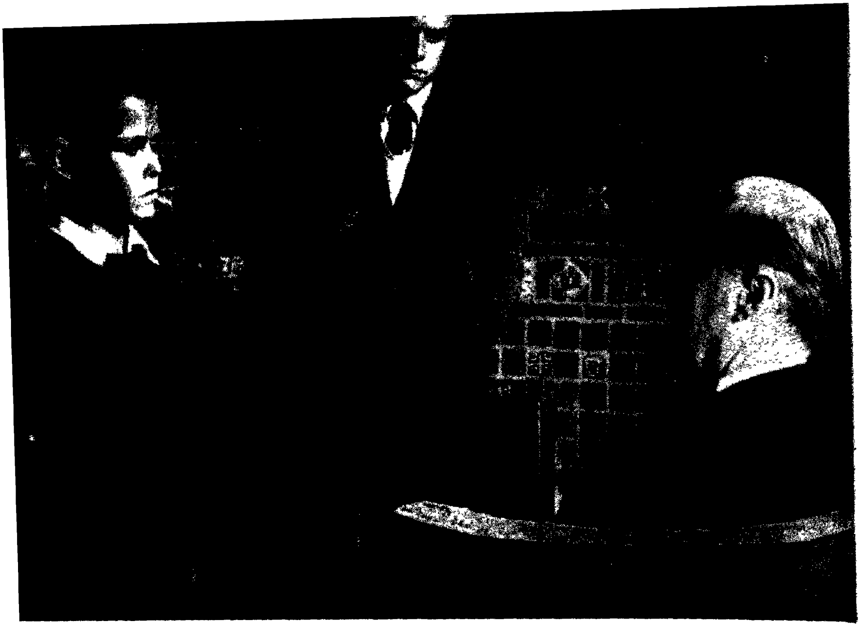
1. Find out what caused the difficulty.

2. Find out whether you were trying to do something that was too hard for you. If it was too hard for you, turn your attention to something you can do. If it was something you should be able to do, get help in learning how to do it well.

3. Find something good in every situation and build on that.

4. Give your full attention to whatever you are doing; do it as though there was nothing else in the world you would rather be doing.





Bill had a younger brother, George. Often Bill thought he was punished for things that George did and that were not really Bill's fault. One day Bill and George were getting dressed. George grabbed Bill's socks and threw them up on the bookshelf. Bill was in a hurry and gave them a jerk. Down came a bottle of ink, too. It spilled over the new rug. Their mother was angry. Their father came in. George said, "Bill did it." What would you have done if you had been in Bill's place?

Bill told exactly what happened. He admitted that he should not have pulled his socks down so hastily. But he also said George should not have grabbed his socks. Bill's father agreed that both boys were to blame.

Bill used to get angry at his younger brother, but he soon learned that getting angry made matters worse. Now he pays no attention to a great deal of George's

teasing, and George does not bother Bill much any more because he gets no satisfaction from it.

It is unfortunate when brothers and sisters do not get along well together. Sometimes the older child feels left out when a baby brother or sister comes. The baby gets most of the mother's attention. The older child may think his mother no longer loves him. Probably she is just too busy to give him as much attention as she did before the baby came. If the older child understands that, he will not be mean to the baby. If he takes good care of the baby, his mother will be pleased and love him more than ever.

Sometimes older brothers and sisters have the habit of ordering the younger ones around. The younger ones grow tired of orders. Just because you happen to be a year or two older is no reason for you to expect to be waited on. Your younger brothers and sisters want to play, too. You can do pleasant things for one another. Try doing something for them part of the time and see how much better you get along.

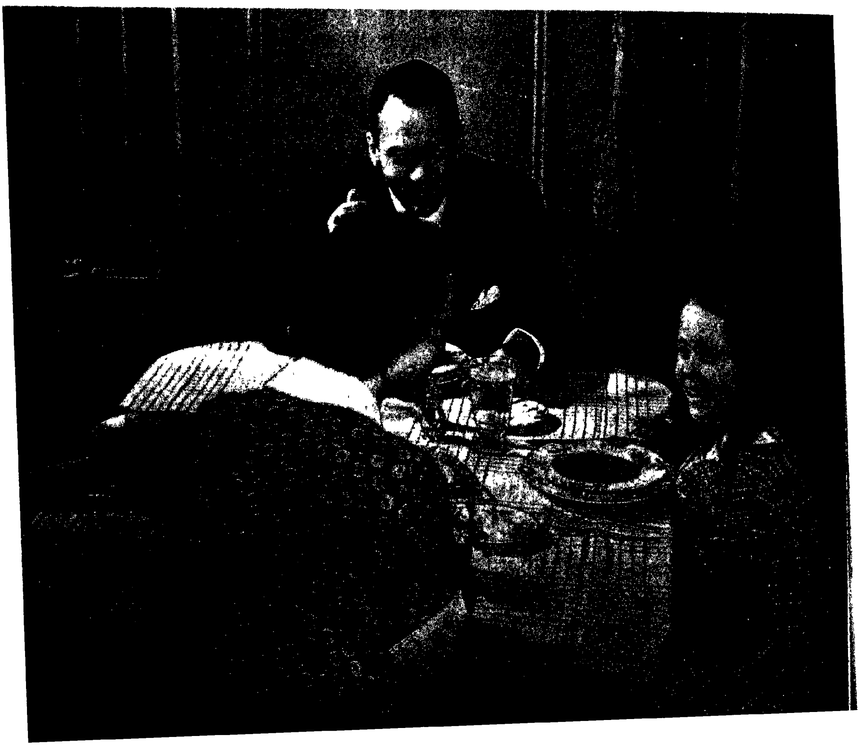
You may think that little children should be able to do everything as quickly and as well as you or that they should know better than to do some of the things they do. When you were their age, did you always act as you now think they should? They have to learn. You can help them learn the best thing to do.

If your mother or father says that you cannot go to a ball game until you have done your work at home or if one of them says that you cannot have something you want, try to see why. There may be a very good reason. Arguing, sulking, or teasing will not help matters.

In many families the boys and girls talk things over

with their parents. All the family help plan what to do and ways of making the home a pleasant, comfortable place. These families are happy because each person does his share of the work and play. Naturally your father and mother have to make some of the decisions. They have more experience and can see farther ahead than most boys and girls. Learning how to work and play happily with your family now will be useful when you are grown up and have a home of your own.

Some difficulties in daily living are prevented by everyday good manners. When you were small and learning how to eat your food, your mother taught you good table manners. If you practice good manners every day, then, when you want to be very polite and make a good impression, good manners will be natural and easy for you. You



will never feel ill at ease; you have learned "the thing to do" in any situation. Good manners grow out of thinking of other people and doing unto others as you would like to have them do unto you. Someone has said that good manners are the oil that takes the friction out of living.

Do you face facts fearlessly? It is often hard to do this.

One day Tom lost his brother's fountain pen. What would you have done if you had been in Tom's place? Tom told his brother: "I lost your fountain pen today, Arthur. But I'll buy you another one as soon as I can earn the money." Tom got work with a grocer, delivering orders after school and on Saturdays. He was very much pleased when he could buy his brother a new pen just like the one he had lost.

Tom did not stop working after he had earned money for the pen. He and one of his friends took turns delivering the groceries. Tom worked one day and his friend worked the next day. In this way they had some afternoons for play and some for work. Tom also had money to buy a new bat and ball and other things he wanted.

Mary got a low mark in arithmetic on her report card one month. What would you have done if this had happened to you? Mary went to the teacher after school to find out the reason for the low mark. The teacher showed Mary the problems in which she needed more practice and gave her practice exercises to do. Mary is sure her work will be better next month.

Jim entered the *athletic* * meet in his school with high hopes of winning. His friend Ted was in the meet, too. When the day came, Ted won the broad jump and the high jump. Jim was in the fifty-yard dash. "On your marks, get set, go!" Jim crossed the finish line third.

What would you have done if you had lost the race? Jim's first thought was to go to the dressing room, change his clothes, and sneak home without seeing anyone. But he didn't do that. Instead, he found Ted and said: "That was great jumping, Ted. You certainly know how to jump."

The next day he went to the physical-education teacher and learned more about running. The physical-education teacher gave him the following rules to practice:

1. Get a good start. At the command, "Go," give a strong push from both feet.
2. Keep the body low and the weight forward.
3. Toe in and push with the feet.

4. Keep your eyes straight ahead. A straight line to the goal is the shortest distance.

5. Don't slow up near the finish. Run beyond it.

Jim is practicing these points and has greatly improved his form in running.

When you face the facts, you may find that you yourself can find a good way out of an unpleasant or difficult situation. Often all you need, like Jim, is more practice. Sit down and do some thinking. See how you can prevent the same mistake again. To blame someone else will not help. A little child kicks the chair he ran into and calls it naughty. The kick hurts his toe. He blames the chair for his bumps. You realize that you should look where you are going. You would move the chair to a place where no one would be likely to run into it again. This shows that you are more grown up than the child is.

Habits of working and playing wholeheartedly are most important. Some boys and girls spend half of their schooltime looking around the room, playing with an eraser, daydreaming, or talking with other pupils. Other boys and girls spend their time in school studying and thinking hard. The boys and girls who spend their study periods really studying are forming habits of good attention. They have time for play after school because they have done so much of their studying in school. They do not have to say, "No, I can't go skating this afternoon; I have to study." They used their school time well.

If you are really doing your best and are still failing in your schoolwork, you need help in finding the kind of work or the kind of school in which you can do good work. Talk it over with your teacher, with someone else who knows your ability, or perhaps with someone whose

special work it is to help boys and girls to find out the kind of work they can do best.

"The worst troubles are the ones that never happen." Have you ever heard that saying? Some people worry over difficulties that might occur. They spend all their time and energy in worry instead of doing something to prevent the difficulty.

For example, you know that you are going to have a test in school. You have been studying and getting passing grades. You have time to review. Then you hear other boys and girls saying that the test will be very hard and that they are sure they will fail. Do you begin to wonder whether you really know enough to pass? Some boys and girls become so upset they cannot study. They sit and worry. When the day comes for the test, they are not able to do problems they could easily have solved if they had kept their heads. Or perhaps you have not been studying very hard. You begin to feel guilty about the nights you played ball or went to the movies instead of doing your homework. You still have some time to study unless you spend that time worrying and saying you will never let your work go again. Worry helps no one.

There are enough real difficulties and problems without making up imaginary ones or falling into the habit of expecting the worst.

4. *How good bodily health helps in the adventure of growing up.* The way we look at life and meet everyday situations certainly helps us to grow up right. It is good mental habits that we have just been learning about. But have you noticed that you have better adventures when you are also well and full of energy? What helps us to be well so that we may enjoy better adventures?

Food aids adventure. On one of the last journeys that was made by dog teams toward the South Pole the explorers had a diet that was carefully planned. Each man had a little more than two pounds of food a day—finely ground dried beef and fats, biscuits, sugar, powdered milk, oatmeal, chocolate, dried vegetables for soup, tea, bacon, butter, peanut butter, malted milk, cocoa, and lemon powder. Why do you suppose these foods were chosen? There is no neighborhood grocery store near the South Pole. Dried or powdered foods weigh less and take up less room. The explorers stayed well because all their food was wisely chosen. You have already learned that food may make the difference between growing and not growing, between sickness and health, and between weakness and strength. This year you will learn more about *essential* * food *elements* *—what they are, how they help you grow, and which foods contain them.

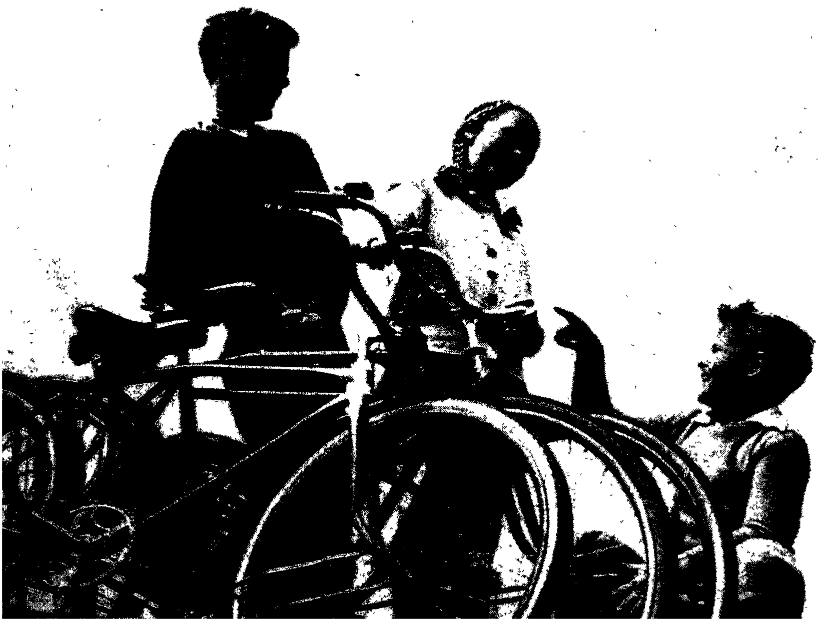
Sleep aids adventure. During sleep the body *cells* * are rebuilt by rest and their energy is restored. It is impossible to have vim and vigor if you get too little sleep night after night and too little rest day after day. Children whose time for sleeping was much shortened in an experiment became so quarrelsome after a few days that they had to go back to their regular hours of sleep.

Suitable exercise aids adventure. By means of exercise the muscles are trained to obey. A teen-age boy or girl with trained muscles can have glorious adventures.

Cleanliness aids adventure. If you have been camping, you know that cleanliness rules as soon as the camp site has been chosen. Safe water is secured. Wastes are disposed of in a *sanitary* * way. Wise campers do not run the risk of spoiling their adventure by sickness. A clean

body and fresh clothes make you feel better. They make you more attractive to other people. You are more likely to be healthy when you keep yourself, your home, and your neighborhood clean.

Avoiding *fatigue* * and strain of all kinds aids adventure. Have you ever been too tired to enjoy yourself? Overdoing one day blocks the way to good adventure in the days following. Have you ever found this to be true? Tom played ball so hard one Saturday that his muscles hurt when he tried to play the next week. He had strained his muscles. Jack took such a long climb up the mountain the first day at camp that he was stiff and sore for a week. He had strained his muscles by using them too much before they had been trained for hard exercise. Big-league ball players begin training early, long before the strain of a big game.



All the health habits aid the adventure of growing up. Any of them may make the difference between being ready for outdoor adventure and being ill at home. Give illustrations of this from your own experience.

An annual health examination at the doctor's office or in school is a good beginning to an adventurous year. The doctor will look for nests of *bacteria* *—*foci of infection* *—in tonsils and nose. If he finds any foci of infection, he will tell you how they should be removed. He will examine your eyes, heart, lungs, teeth, nose, and throat. He will tell you whether you have any physical defects that should be corrected. Physical defects interfere with the best health possible for you—the kind of health that makes mere living an adventure.

In the health-examination room there is usually a chart with pictures or letters on it. To test your eyesight,

the doctor or nurse will ask you to tell what you see on the chart when it is twenty feet away from you. There are scales to measure your height and weight. Most boys and girls are interested in their health records. They like to see how much they have grown and how much they have gained in other ways during the year.

The doctor may help you to plan a healthful daily schedule for the fall or winter. In this daily plan you will wish to include three wholesome meals served at about the same times each day, a regular bedtime, about ten hours of sleep, at least two hours out of doors, time always to wash your hands and face before eating and to take an allover bath frequently, time to study, time to help your mother and father, time with your family and friends, and time to yourself.

In many schools the health examination of pupils is now a part of school life, just as are examinations in arithmetic, reading, and history.

Growing up should be a lifelong adventure. After our bodies are grown, our minds and interests must go on growing. If mind and interests do not grow, good adventure ends and life becomes a burden. If you learn to live now, you can look forward eagerly to adulthood.

Problems to Solve

1. Marie was unhappy in junior high school because she did not have any friends. No one came up to talk with her when class was over. In the lunchroom, when she started to sit down with a group, someone would say, "Oh, I'm sorry, but we were saving that seat." One day when this happened, Marie became angry and told the girls what she thought of them.

Why did Marie act as she did? Was it because:

a. being accepted by one's group is very important to everyone?

b. Marie needed to feel she "belonged"?

c. Marie needed to feel successful socially?

d. she had not learned how to make friends?

e. being "left out" hurt Marie, and made her feel like hurting those who had been mean to her?

f. she did not think of a better way out?

2. Walter wanted to go swimming, but his mother said it was too cold. That made Walter angry and he rushed out of the house. He didn't look where he was going and ran into a boy on a bike. Both boys were hurt. How might Walter have solved the problem of not being allowed to go swimming? Which of these ways would be best? Why?

a. To think, "Mom is just mean. She's always spoiling my fun and treating me like a baby."

b. To say, "Mom, don't you think I'm old enough to know when the water is too cold? I can take care of myself."

c. To say, "Okay, Mom, I'll take a ride on my bike this time."

d. To think, "It will be hot soon, and then I can go swimming every day. I'll do something else that's fun today."

3. Bill wanted to have a few good friends. But he had difficulty making friends. Some of the boys called him a sissy because he would not take dangerous dares. He did not have money to give for the class party, and some of the kids said, "Are you too poor to help pay for the class party?" All this made him feel like running away by himself. It was true that his parents could not afford to give him the money for the party but he felt hurt and embarrassed when his classmates spoke as they did about it.

Which of the following do you think would be the best way for Bill to solve this problem? Why?

a. Go off by himself and read or do other things alone.

b. Try to get some work on Saturdays to earn a little spending money.

c. Take some of the dangerous dares to show that he is not afraid.

d. Practice on one sport, such as baseball or basketball, or on music until he is so good at it that the boys will want him in their team or band.

e. Show his interest in the things several of the other boys are doing or making, and help them if they want him to.

f. If the others tease him, try to see the funny side of it and laugh with them.

4. If your classroom is not as healthful as it should be, how would you help to solve this problem? Are these solutions practical—could you and your classmates carry them out? What else is needed in your school?

a. Bring in flowers and growing plants.

b. Dust the woodwork and tables with a damp or an oiled cloth.

c. Fix the shades so that everyone has the best light possible, without glare.

d. Watch the thermometer and keep it at about 68°F.

e. Have a box of paper handkerchiefs on hand for anyone who needs them.

f. Encourage everyone to stay home from school at the first signs of a cold or sore throat.

g. Help make it easy for everyone to wash his hands before eating and after going to the toilet.

5. If you move to a new town or go to a new school, how can you begin to make friends? How can you help new pupils in your school make friends and feel at home?

6. There are many facts in this book. From a number of facts a person can often draw a conclusion. For example, if many experiments show that animals and children stop growing and become sick when certain foods are taken from their diet, you could draw these conclusions: (1) that these foods make the difference between growing well and failing to grow and between sickness and health and (2) that these foods are essential to growth and health. What conclusions can you draw from facts you have read in this book thus far?

7. In every chapter of this book select one idea that seems very important to you. Make a cartoon or a comic strip illustrating the idea. For example, you might make a cartoon about Mary who got a low mark in arithmetic. You could draw one picture showing a poor way to handle the situation and other pictures showing good ways to handle it. Or you could draw illustrations of ways a person might act if he did not win a race, and tell which of the ways are best. Each chapter is full of ideas for you to illustrate. Put your drawings in a class exhibit for each chapter. You could then make them into a health book of your own.

Acting out, or role-playing, some of these situations also would be fun. For example, think of yourself as Mary; another student will play the role of the teacher. Show the way you think Mary should handle the situation of getting a low mark.

Discussion Questions

Discuss the following statements which Peter has made about growing up. Do you agree with all he says? Tell some stories like the ones in this section to illustrate the statements that are correct. Rewrite those statements that

might be more nearly true if they were changed. (Do not write in this book.)

1. You cannot have adventures unless you go far away from home.

2. A good way to make friends is to find what other people are interested in.

3. Good health habits aid adventure at home and on trips.

4. Good manners are only for company.

5. Good food aids adventure.

6. Being tired spoils good times.

7. It is a good plan to have a health examination at the beginning of the year.

8. You can learn to face facts in most situations.

9. Habits of good attention are helpful only in school.

10. You should always take the blame even if you are only partly to blame.

11. Always solve your problems for yourself instead of talking them over with someone else.

12. Girls have their spurt of growth about two years before boys do.

Interesting Books

Allen and Briggs—*Behave Yourself*
Bailard and Strang—*Ways to Improve Your Personality*
Boykin—*This Way, Please*
Fox—*Wilfred Grenfell*
Glendening—*Teen Talk*
Leaf—*Health Can Be Fun*
Leaf—*Manners Can Be Fun*

UNIT II

BUILDING BLOCKS OF THE BODY

"It's a mystery to me how things grow," said Dan.

"A mystery story!" said Sue, laughing.

"It is a mystery scientists are still trying to solve," sa Sue's older brother.

"The mystery of what makes growing things so d ferent! Some plants grow in the desert," said Dan, "oth grow in the jungle."

"Some animals grow very big—like the elephant," sa Sue, "and some are always little—like mice."

"The way anything grows depends on two thing something inside it and the place where it lives. We c these two things heredity—what we are born with—a environment—the place where we live," Sue's broth told them.

"But just how do I grow?" asked Sue, still puzzled.

The next pages will help you to answer this questio

PLANTS GROW THICK IN A TROPICAL FOREST.

HOW CELLS ARE BUILT

CELLS OF PLANTS

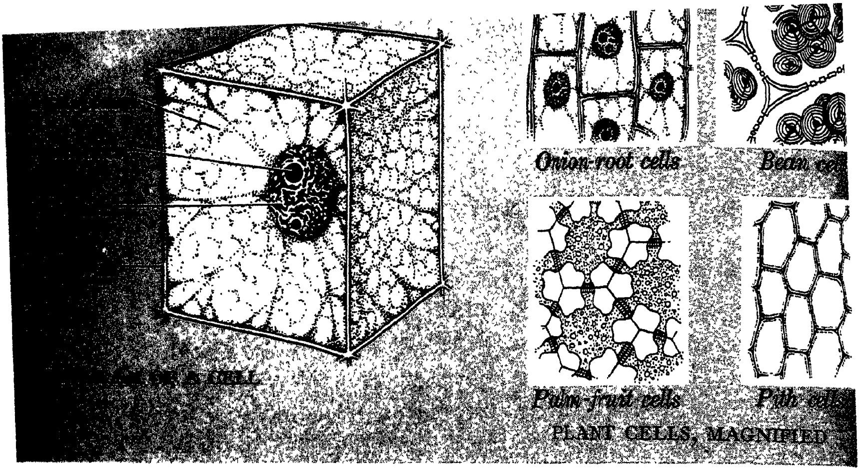
There are plant cells and animal cells. The plants you see every day are built of millions of cells.

Plant cells need certain things in order to live and grow. They must have air, the right temperature, water, and food. The life of plants is affected by other plants and by animals and by the conditions in which they live. Think how different the plant life on the desert is from plant life in a tropical forest.

Sunlight is the source of food. Green plants cannot live all the time in the dark. They cannot manufacture food in the dark. But neither can they stand too much heat. The best temperature for most plants and animals is between 68° and 85° F. Too strong sunlight makes the leaves of most plants wither. These plants cannot draw water from the soil as fast as the sun evaporates it from their leaves. This is why a field of corn wilts after a few days of very hot, dry weather.

All plants need water, but some kinds of plants need more than others. That is one reason why different kinds of plants grow in different places. Look at the pictures on pages 49 and 50. What kinds of plants grow in the desert? What kinds of plants grow in a tropical forest?

Two other things all plants need are in the air. These are *oxygen* * and *nitrogen.** In addition to the elements oxygen and nitrogen all green plants must have *carbon dioxide,** which is not an element. Plants get all the carbon dioxide they need from the air, even though there



is only a small amount of carbon dioxide in the air. Oxygen, like carbon dioxide, is necessary for the life of plant cells. There is plenty of oxygen in the air. But most plants get nitrogen in a roundabout way. Although four fifths of the atmosphere is nitrogen, plant cells cannot get it directly from the air. Friendly bacteria get it from the air and put it in the soil. Then the plants can get the nitrogen through their roots.

Minerals * that plant cells need are also brought up from the soil by the roots of plants.

All these things plant cells need in order to live and grow.

If you could take bits of different plants and look at the plant cells under a strong *microscope,** you would see many different sizes, shapes, and patterns, like those in the drawing above. One child said pictures of plant cells look like patterns for dress materials or linoleum.

Each cell is made of *protoplasm,** which looks like a watery jelly. About 80 to 90 per cent of protoplasm is water. No wonder plants must have water! In the center is a thickened, or *concentrated,** bit of protoplasm. This

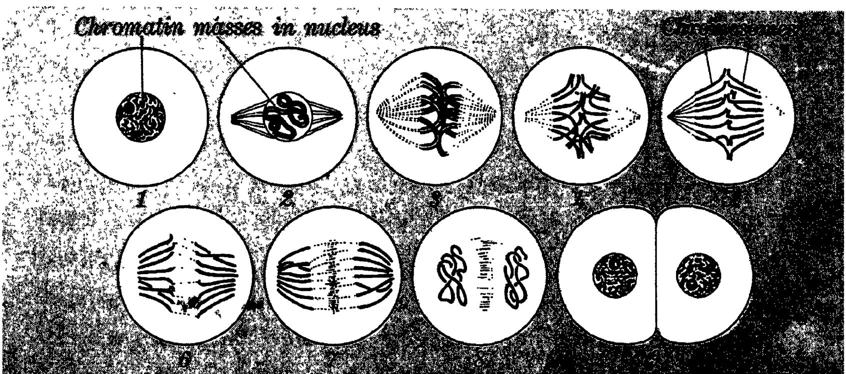
is the *nucleus.** Around the nucleus another part of the cell in a green plant makes food for the cell.

Without plants we could not live. Plants give us much of our food directly. Plants that lived thousands of years ago give us coal for heat and for power to run our machines. In what other ways are plants important to us?

CELLS OF ANIMALS

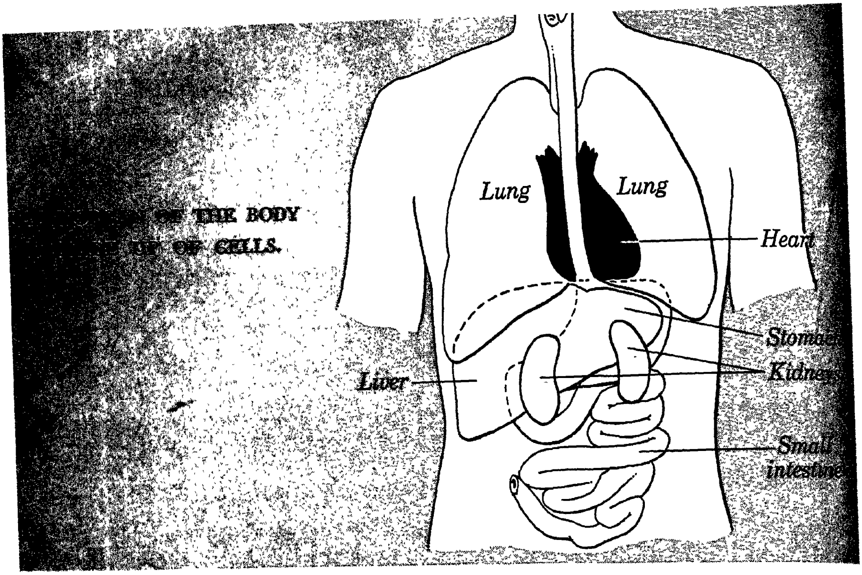
The story of animal cells is similar to the story of plant cells. Animals need warmth, water, oxygen, and food. The animals one commonly sees are many-celled, but there are *microscopic* * one-celled animals also. Human beings are of course many-celled. Cells grow and divide to form new cells. We are building many kinds of body cells throughout life.

Your muscles, bones, blood, and other parts of the body are built of billions of tiny living cells. Muscles grow bigger as the number of muscle cells becomes greater. Bones and other parts of the body grow in the



CELL DIVISION, THE BEGINNING OF NEW [illegible]

When a cell begins to divide, the [illegible] arrange themselves in lines (2) and divide [illegible]. One part of each line stays in the old cell, and one part goes into the [illegible]. The number of lines is always the same for a certain kind of plant [illegible] animal, but it is not the same for all plants and animals.

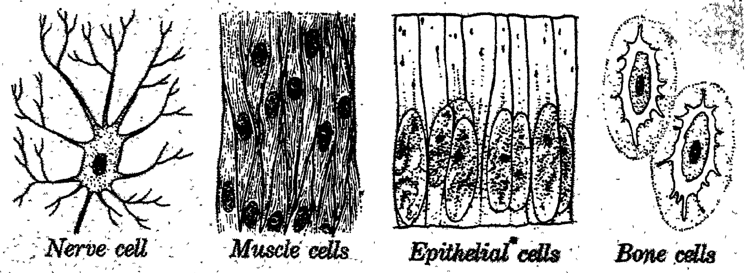


same way. Groups of cells that are alike are called *tissues.** The tissues with which you are most familiar are bone tissue, muscular tissue, and nervous tissue.

Some tissues are combined to form *organs.** The heart is an organ. The lungs, stomach, *intestines,** liver, and eyes are all organs. Each organ does a different kind of work. Study the picture above of the principal organs.

A number of organs that work together are called a *system.** You know that the digestive system changes the food you eat in such a way that the cells can use it. What are the organs of the digestive system? The *respiratory* * system supplies the cells with oxygen. It gets rid of certain waste products, which are given off as carbon dioxide when food is burned in the cells. The *circulatory* * system supplies the cells with blood, from which they take the food and oxygen they need and into which they pour their waste products.

The cells of the body are not like bricks in a wall.



FOUR KINDS OF BODY CELLS, MAGNIFIED GREATLY

They are living. Like plant cells, they are chiefly masses of the watery, jellylike substance called protoplasm.

The pictures above show some kinds of body cells. You see that every cell has a central part. This part is called a nucleus, you know. Without a nucleus the cell could not live, grow, or change.

A body cell is not so simple as it sounds. To get a better idea of a cell, imagine clocks so small that it would take 8000 to make an inch and 64,000,000 to fill a one-inch cube. Each tiny clock would still tick and tell time. One body cell, made of protoplasm, can do something no clock can do. It can split into two complete cells, each as finely made as the first cell and each working as well.

One *scientist* * divided a one-cell animal into two parts. One part contained the nucleus; the other did not. The part having the nucleus quickly built up the missing part and continued to live in the usual way. But the part without a nucleus soon could not move. It could not digest food. It lived only a few days. The nucleus is essential to the life of a body cell. The cell having a nucleus moves, takes in food, and gives out waste material.

In the body of a person there are about twenty-six

thousand billion cells, one scientist says. In the blood alone there are millions and millions of cells. All these cells must be fed. No wonder food is important!

How do the cells do their work? Millions of cells together form the fifty-eight different muscles and the thirty-two separate bones in your arm and hand. And these muscles and bones can be moved in such a way that you can write a letter and throw a ball. But not only the cells in the arm and hand are necessary in throwing a ball. The cells of the eyes, the shoulders, the back, the legs, and other parts of the body are also used. In fact, cells in all parts of the body have a share in almost everything you do.

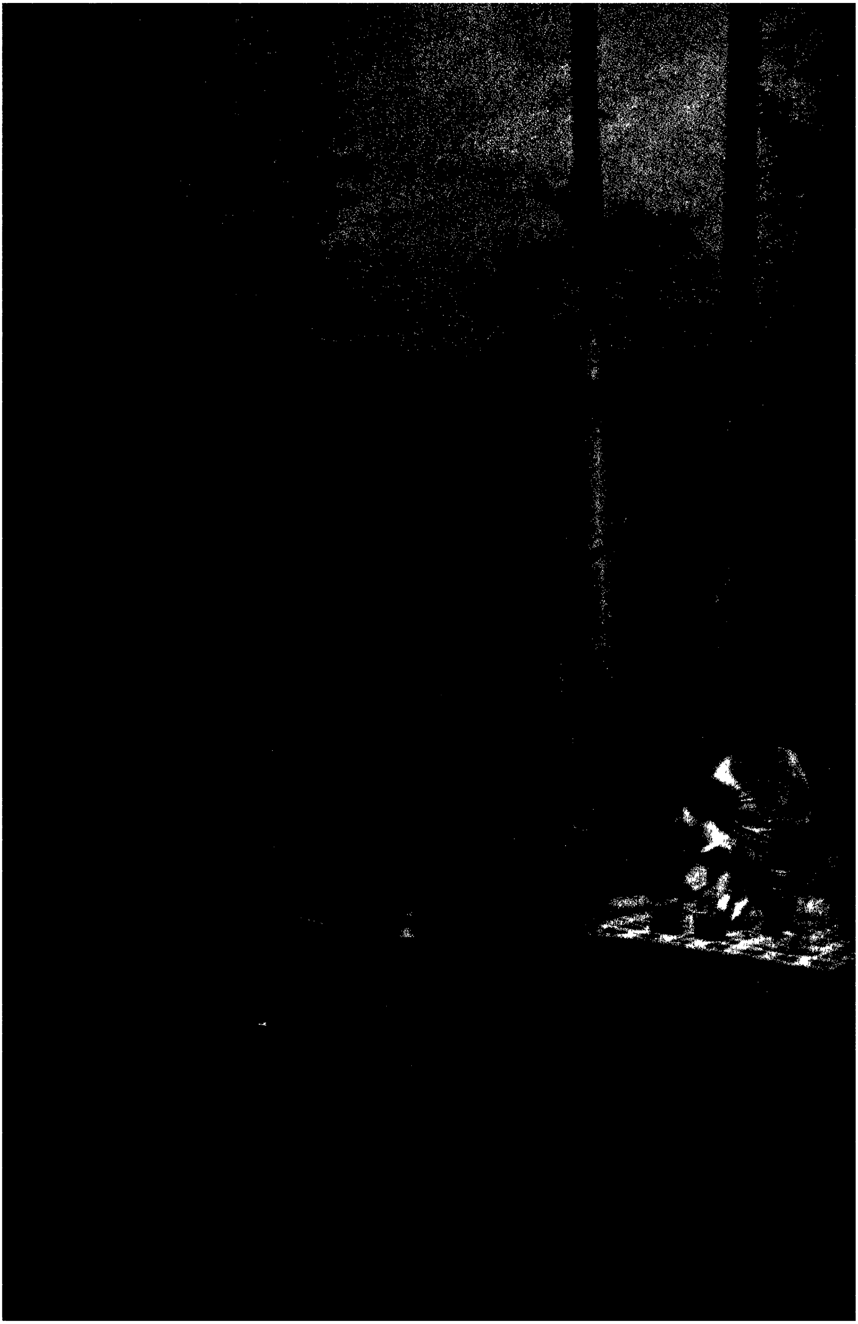
All parts of the body work together even though different parts do special work. This is an important fact. When you have taken a very long walk, you feel tired all over. It is not only your legs that are tired. You cannot neglect or harm or strain one part of the body without affecting other parts.

Cells can do their work only under certain conditions. By giving our body cells all the things they need, we provide these conditions. Then the cells will do the rest.

1. Cells must have oxygen. The air you breathe contains plenty of oxygen. Plenty of oxygen is carried by the blood to the cells. They use as much as they need. When you are asleep, they are not so active. They use the smallest amount of oxygen during rest. Cells use a great deal more oxygen when you are running or playing games than when you are sitting or lying down.

2. Body cells must have water. They are more than 50 per cent water. If water is taken entirely away, the cells die more quickly than does a fish out of water.

A good choice of foods for breakfast



3. Cells must have food. They must be supplied continually with the elements of which they are made. The blood carries these elements to the cells. The cells select the food elements which they need to replace those which have been worn out, or "used up," in cell activity.

4. Cells must get rid of waste material. They must get rid of the carbon dioxide and acid which are formed when food is burned. They must get rid of other waste products. The blood, which brings food to the cells, carries away their waste products.

5. Cells must not be harmed by poisons formed by bacteria, by alcohol, or by other harmful substances.

WHAT CELLS ARE BUILT OF

Of what substances are cells built? There are at least sixteen essential elements in cells. Some cells contain some of those elements; other cells contain others. The body needs different amounts of each. If you have studied science or read science magazines or played a science game, you already know the names of many of these elements. How many of them have you heard of before? How many of them have you seen? With how many of them have you experimented?

Fourteen essential elements of which body cells are built are *carbon,** *hydrogen,** oxygen, nitrogen, *sulphur,** *phosphorus,** *chlorine,** *potassium,** *sodium,** *calcium,** *magnesium,** *iron,** iodine, and *copper.** Two or more other elements are needed, but they are not likely to be lacking in your diet. Ask a science teacher to show you samples of the elements that are not gases.

If you forget to take the toast out soon enough and leave it until it is burned black, you see before you

the first element in the list—carbon. Hydrogen is a colorless gas. There is very little of it in the air we breathe. Oxygen is a colorless gas. You are breathing it now. You could not live more than a few minutes without oxygen. Water is made of these two gases—two parts of hydrogen and one part of oxygen. Perhaps you have heard an older person who has studied science call water H_2O.

Nitrogen is another colorless part of the air you breathe. Some of the nitrogen in the air is changed by bacteria and stored in the ground in a form that can be used by plants. Some plants, like clover, alfalfa, and peas, take nitrogen from bacteria and store it as their food.

The other elements are found in the earth, usually in combination with other elements. They are food for plants. The plants in turn furnish food for animals and men. From plant and animal foods you are able to get elements of which the cells of the body are made.

Let us now learn more about some of the elements that build the cells of the body.

NITROGEN INTO *PROTEIN* *

Nitrogen is needed by every cell, especially by the nucleus. Nitrogen is built into *amino acids.** Amino acids of various kinds are built into proteins. The protein of meat, fish, and milk are rich in important amino acids. Other amino acids are found in the protein of cereals, beans, and nuts. Not all varieties of amino acids are found in any one protein. To be on the safe side, you should eat different kinds of protein, from different kinds of food.

The proteins of milk and wheat make a good com-

bination. Rat families for *generations** grow and keep well on dried whole milk and whole wheat. With more milk the animals live longer, do not show signs of old age so soon, and are healthier than the families on the small amount of milk. It seems quite clear that food has much the same effect on human beings that it has on the animals in the laboratory. The proteins of the cereal grains are most useful in building body cells when they are eaten with a generous amount of milk proteins.

If you had very little money to spend for food, you could get more protein for twenty cents from milk, cottage cheese, oatmeal, and dried beans than from any other foods.

How much protein do you need every day? Boys and girls twelve to fourteen years old should have about seventy to eighty *grams* * of protein daily. The foods named in the first list below would furnish enough protein for a day. You can have some in each meal. No one would want to eat all his protein for the day in one meal, and trying to do so would make a heavy meal.

FOODS SUPPLYING ENOUGH PROTEIN FOR A DAY

One quart of milk
Five slices of bread
A serving of cereal
One egg
A piece of meat or fish
Fruit and vegetables

A MEAL TOO LOW IN PROTEIN

Potatoes and cabbage
Bread and butter
Pancakes and sirup

A MEAL TOO HIGH IN PROTEIN

Meat
Macaroni and cheese
Egg salad
Gelatin

Some boys and girls eat too much meat. They have meat three times a day. For example, they have sausage for breakfast, cold pork and bread for their school lunch, and hot roast meat for the evening meal. They should keep the roast meat for dinner and let milk, an egg, or some cheese, fish, fruits, or vegetables take the place of meat in the other meals. Fish could be used in place of the meat for dinner.

CALCIUM

Calcium is one of the mineral elements that are very important for health and growth. The minerals are sometimes called the ash *constituents* * because, when any food is burned completely, the minerals remain as ashes. If you heated a glass of milk until all the water had evaporated, you would find about 1.3 grams of white ashes left; these are the minerals. Let us now study four of them—calcium, phosphorus, iron, and iodine, the minerals most often lacking in our daily food.

Milk is the best and cheapest source of calcium. One half cup of milk supplies about as much calcium as two pounds of lean beef and ten slices of bread. Green, leafy vegetables are also good sources of calcium. Study the chart on page 61. If possible, help make an exhibit showing foods in the amounts or sizes given in the chart.

Strong bones and teeth cannot be built without calcium. It is an interesting fact that the best race horses in

the world grew up in parts of the country where the soil was especially rich in calcium and phosphorus. That may have been one reason for their fine bones and nerves.

One well-known scientist, after some difficult and careful experiments with children, stated that children under sixteen years of age should have one gram of calcium a day. One quart of milk supplies 1.13 grams of calcium. If you use a quart of milk a day, you need not think further about calcium. If you use three glasses a day, you need not worry, because the other foods you eat supply enough additional calcium to make one gram. However, sunlight and *vitamins* * help to determine how well the calcium you eat is used by your body.

CALCIUM IN COMMON FOODS

Food	*Approximate Measure*	*Proportion of Calcium*
White bread	*1 slice ½″ thick*	
Graham bread	*1 slice ½″ thick*	
Oatmeal	*¾ cup cooked*	
Milk	*1 cup*	
Cheese	*1⅛″ cube*	
Butter	*1 tablespoonful*	
Meat, beef, lean round	*2½″ x 2½″ x ¾″ piece*	
Liver, beef	*3″ x 3″ x ½″ piece*	
Egg	*1*	
Potato	*1 medium*	
Carrots	*¾ cup, cubes*	
Peas	*½ cup*	
Cabbage	*¾ cup, chopped*	
Celery	*¾ cup, pieces*	
Spinach	*1 cup, steamed, chopped*	
Tomato, canned	*½ cup*	
Orange	*1 small*	
Apple	*1 medium*	
Prunes	*4 medium*	
Sugar, white, granulated	*1 tablespoonful*	*None*

Calcium is very common in limestone, chalk, hard water, and other natural substances. Plants obtain it from the soil and then store it in their leaves and their stems. Cows eat the plants and thus the calcium gets from the plants into the milk.

PHOSPHORUS

Like nitrogen, phosphorus is an essential part of every living cell of the body. Like calcium, it is essential for strong bones and teeth. You will be sure to get all the phosphorus you need if you have three cups of milk a day and green vegetables, such as spinach, lettuce, celery, cauliflower, and asparagus. Eggs, too, contain phosphorus. Cereals and bread made of whole grains, as well as dried peas, beans, and lentils, are also good sources of phosphorus. To get the most phosphorus for your money, buy cheese, dried peas and beans, and fish.

IRON

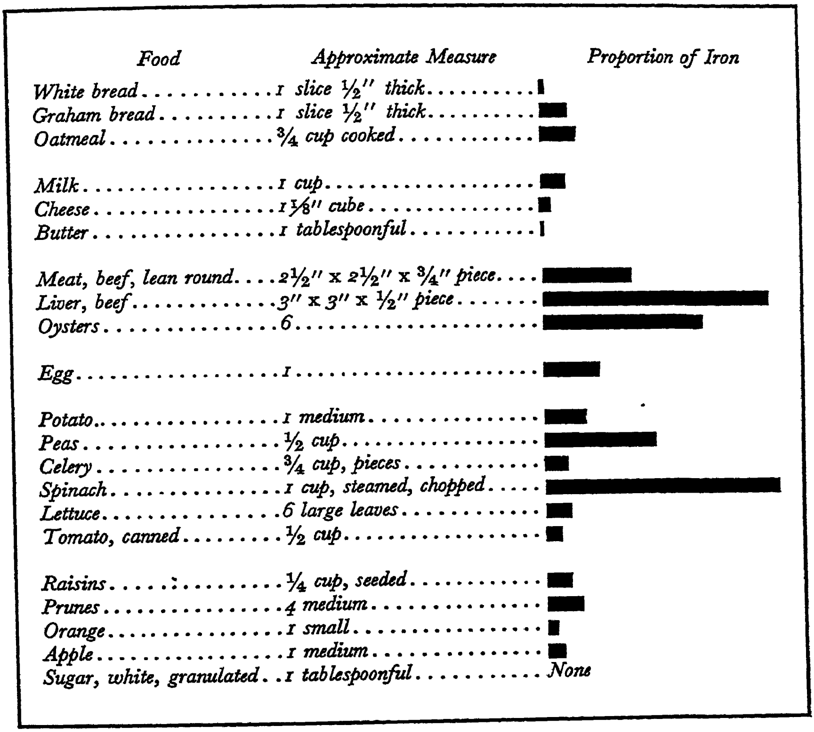
"Have you had your iron today?" Why is iron important? Perhaps you have heard that "iron makes red blood." Yes, iron is an essential part of the red blood cells. It helps them carry oxygen. But it is also an essential part of every living cell in the body. In the first few months of his life the baby is given orange juice, prune juice, spinach juice, and egg yolk. These foods help to supply iron.

You need about .013 gram of iron daily. That seems like a very small amount. If the iron requirement were written in another way, it would be 13/1000 of one gram. Can you imagine how small an amount this is? It is just a speck, like a grain of sand. Why bother about such a

small amount? This speck of iron may make the difference between health and sickness. A person does not always get as much iron as he needs because iron is present in foods in very small amounts.

FOOD	IRON, PART OF GRAM
Milk, 1 quart	.0023
Whole-wheat bread, 6 slices	.0020
Egg, 1	.0014
Potatoes, 2 medium	.0030
Spinach, 1 large serving	.0040
Prunes, 4	.0010

IRON IN COMMON FOODS



Add the thousandths of a gram of iron in the foods in the list on page 63. If you ate these foods every day, would you be getting the amount of iron you need—.013 gram? Whole-wheat bread supplies about twice as much iron as white bread. This is one reason for eating whole-wheat bread or bread enriched with iron and vitamins. You can see in the chart on page 63 which foods are richest in iron. You can buy iron most cheaply in dried beans, oatmeal, and whole-wheat bread and cereals. Spinach is rich in iron, but its iron is not used by the body as completely as the iron in some other foods.

An average helping of oysters would supply about 41 per cent of the amount of iron that an average man needs daily. Oysters are almost as valuable a source of iron as liver. They contain some copper, too, which seems to work with iron in making red blood. Without some copper the body cannot make use of iron.

IODINE

You have very likely heard of iodine before. Perhaps you have had a cut on which someone put a reddish brown liquid. That liquid was *tincture* * of iodine. In that form and strength iodine is a poison. In another form it is an important food element. The iodine in food is quite different from the poisonous iodine in bottles.

Iodine is found in very small quantities in the soil. It is dissolved by water and carried to the ocean. As the water evaporates, it leaves the iodine behind. So the sea is rich in iodine. People who live by the sea seldom have *goiter,** a disease of the *thyroid gland* * caused by a lack of iodine. In parts of our country goiter is common. Girls about twelve to fifteen years old, in parts of the country

where the soil is lacking in iodine, often have a swelling at the front and sides of the neck which is a sign of goiter. Goiter is not a simple disease. It should be treated by a doctor—not by home remedies.

Sea foods are the richest sources of iodine. Oysters, clams, and salmon roe (the fish eggs) are very rich in iodine. Certain fish, especially salmon, cod, and halibut, are also good sources of iodine. Vegetables in some states contain relatively large quantities of iodine. Some of the potatoes in our southern states contain enough iodine in a single medium-sized potato to furnish the amount of iodine a man requires in a day.

People who live inland far from the sea or on mountains high up from the sea often suffer from lack of iodine. If you live far from the sea, ask your doctor how to get the iodine which you need.

GETTING MINERALS LONG AGO

We know that people long ago suffered from lack of minerals. Skeletons of people who lived thousands of years ago show the effects of too little calcium.

In ancient China milk was scarce. Most of the children had little milk or none at all. A much-used medicine was powdered "dragon bone." This was made from the bones of strange animals that had died on the deserts. These bones were ground or powdered and fed to sick children. Sometimes this medicine helped. Do you see why? The powdered bone contained calcium, a mineral that was lacking in the Chinese children's diet.

Some of the ancient Greeks had goiter. They discovered that the ashes of burned seaweed or sponges helped to cure this disease. Can you explain why this was so?

1. Explain this verse in your own words:

> It's a very odd thing—
> As odd as can be—
> That whatever Miss T. eats
> Turns into Miss T.[1]

2. In one school, more than a third of the boys and girls spent ten cents or more on sweets during the day. Of these, about one third had less than one cup of milk, more than one fourth had no milk at all, almost three fourths had no oranges or other citrus fruit for the day. How could these boys and girls be helped to spend their money more wisely? What would you say to them that would make them want to buy fruit and milk, instead of candy and soft drinks?

3. Do you have "that tired feeling" most of the time? Do your parents and teachers say you are "just lazy"? Maybe there's a good reason for your tired feeling. Maybe your body cells are not getting the food elements they need. How can you find out? How can you use pages 58 to 65 of this book to check on whether you are getting enough of the different kinds of protein, enough calcium, phosphorus, iron, and iodine?

If you are not getting enough calcium, how can you be sure to get enough?

If you are not getting enough iron, what foods would you eat to supply it?

If you live far from the sea or high up on a mountain, how can you be sure you are getting enough iodine?

4. Write the names of the foods you ate yesterday. Recall which of them contain calcium, which contain iron, and which of the many different vitamins are found

[1] Walter De La Mare, *Peacock Pie*, p. 27. New York: Henry Holt and Company, 1927.

in each. Did you have some protein? In which foods? The richest sources of protein are meat, milk and milk products, white of egg, fish, dried peas and beans, nuts, and gelatin. But bread and cereals are also important sources of protein because we eat so much of them.

5. Get as many pictures of different foods as you can find. Put pictures of those foods that supply calcium in one group. Make another group of good sources of phosphorus, one group of iron, and one of iodine. Which foods appear in more than one group? Later use your groups for posters.

6. What conclusions can you draw from the facts in this section?

Discussion Questions

How many of Lucille's sentences are correct statements? Discuss them in class. Change any you think are wrong. (Do not write in this book.)

1. Green plants must have sunlight.
2. Protoplasm is chiefly water.
3. A cell without a nucleus cannot live and grow.
4. The respiratory system carries food to the cells.
5. Your body cells get most of the food elements they need from the cells of plants and animals.
6. Meat and milk are both rich in protein.
7. Boiled eggs, meat sandwiches, cheese, and nut cookies make a good meal.
8. Tissues are groups of cells acting together.

Test Yourself

Edward has left places for you to fill in. Copy each of his sentences in your health notebook and fill in the missing words without looking in your book. The num-

bers (1), (2), (3), and (4) mean that Edward thinks you should be able to give four of the sources of calcium, phosphorus, and iron. After you have finished filling in all words, find your score. Discuss the sentences in class.

1. Good sources of calcium are (1) xxx, (2), xxx, (3) xxx, and (4) xxx.
2. You need xxx of milk each day.
3. Phosphorus is found in (1) xxx, (2) xxx, (3) xxx, and (4) xxx.
4. Lack of xxx in drinking water or in food may cause xxx.
5. Calcium helps build strong xxx and xxx.
6. Iron helps carry xxx to the cells.
7. Another name for *ash constituents* of food is xxx.
8. Good sources of iron in food are (1) xxx, (2) xxx, (3) xxx, and (4) xxx.
9. Milk supplies xxx minerals. They are xxx.
10. A cell grows and divides to form xxx cells.
11. The nucleus of a cell is necessary for its xxx.
12. Different parts of the body do special work, but all parts work xxx.
13. Cells of the body must have xxx, xxx, and xxx.
14. One element that helps to build protein is xxx.

Interesting Books

Ahrens, Bush, Easley—*Living Chemistry,* pp. 130-175

Brandwein, Hollingworth, Beck, Burgess—*You and Your World,* pp. 65-67

Knox, Stone, Meister, Wheatley—*The Wonder World of Science,* Book Six, pp. 7-40

Meister, Keirstead, Shoemaker—*The Wonder World of Science,* Book Eight, pp. 129-177

Schneider and Schneider—*How Your Body Works*

Watkins and Perry—*Science for Daily Use,* pp. 415-444

UNIT III

ARE YOU A WATER ANIMAL?

We are more than half water. A grown person's bod contains about eleven gallons of water. There is a gallo of salty water just in our blood vessels.

Many of the cells in our bodies are like the one-cel animals living in the sea. The water around these bod cells is always in motion. Our cells cannot live withou water any more than a fish can live without water.

Read this unit to find out more about the body's nee for water and how you can get safe water.


OR WHY NOT?

WHY THE BODY NEEDS WATER

There is one thing you need wherever you are. You need it at home and at school. You need it when you go camping or when you take a long walk. You need it when you are taking a day's trip on a train. What is it? You have probably guessed the answer—water.

Water is essential for *digestion* * of food, for circulation of the blood, for *elimination* * of waste, and for all the other processes of living. A loss of 10 per cent of the water in the body is serious. A loss of 20 to 22 per cent means death.

That is why men, from earliest times, have been concerned about water. They have always built their homes near rivers or lakes or on oases. Today they store up water in great reservoirs for the use of large cities. Even animals know where to find the water holes and other sources of fresh water. The camel has several pockets in its stomach which, somewhat like a sponge, will hold enough water to enable it to go days without drinking.

Why do plants and animals and human beings all need water? Why do we get thirsty when we have been without water a short time?

About 60 per cent of the weight of the human body is water. That is, if you weigh 100 pounds, about 60 pounds is water. The blood is 75 to 80 per cent water. Water is stored in the spaces between body cells. It is drawn from storage as it is needed to keep the percentage of water in the blood always the same. Drinking a large amount of water does not thin the blood. The extra water is stored in the tissue spaces or eliminated by the *kid-*

neys * and skin. Water makes circulation of the blood possible.

Water is the great *solvent.** Have you ever put salt or sugar in water and watched it disappear? Salt and sugar quickly dissolve in water. Water dissolves salt from the earth and carries it to the ocean. That is why the ocean tastes salty. Ocean water contains iodine that has been dissolved from the land. Water dissolves iron and calcium and other minerals in the soil so that plants may get them up through their roots and use them for food.

In the process of digestion all the food must be dissolved and changed before it can be used by body cells. Water helps to dissolve our food, for it is a part of all the digestive juices that help to change food into *soluble* * form. Water helps to wash away the waste products of the body. Water is very important in carrying certain of the body wastes out through the kidneys.

The kidneys are small organs, only about four or five inches long and one and a half inches wide. Like the heart, they do an almost unbelievable amount of work. They help remove body wastes. A steam engine at work always leaves wastes, such as smoke and ashes. When the body cells work—and they are working as long as they are living—waste products are given off. The kidneys are of great importance in removing waste substances carried from the body cells by the blood.

The process of removing waste products from the body is called *excretion.** Carbon dioxide leaves the body by way of the lungs; some water and salts are excreted by the skin; and the solid wastes of food, bacteria, and certain salts are excreted from the large intestine. Other waste products of the cells are excreted by the kidneys.

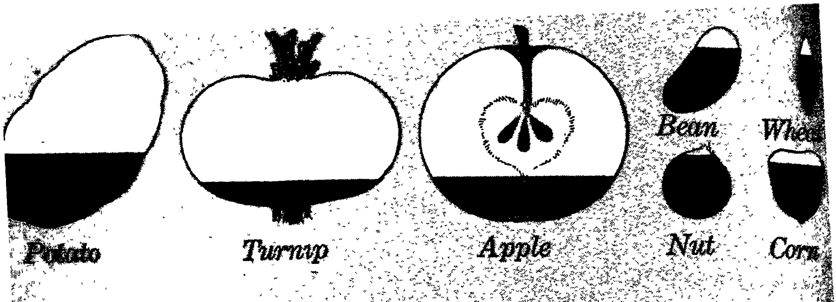
der.* The bladder is a muscular bag. It can hold the urine for several hours until the person is ready to *urinate* *—that is, pass it out of the body. The drawing on page 74 shows how the kidneys are connected with the bladder. The bladder, in which the urine is held, may be irritated by concentrated urine, that is, urine that has not been thinned sufficiently with water.

A very, very small amount of body waste is washed out through the skin in *perspiration.** But since the perspiration is over 99 per cent water, you can see that it does not carry much waste material from the body. Perspiration is more important in keeping the body temperature the same, whether the day is hot or cold.

It is not only the inside of the body that needs water. Water of course is needed on the outside, too. You need water to keep your body and your clothes clean and for preparing and cooking food. You need water to wash thoroughly fruit and vegetables that you eat raw. It is still safer to pare apples and pears from trees that may have been sprayed with *arsenic* * to kill insects. The ends of the fruit, where the largest amount of spray collects, should be cut away.

HOW MUCH WATER IS NEEDED?

How much water should you drink daily? The amount of water you need depends upon a number of things—how hot the weather is, how much you are perspiring, and how much water is in the foods you eat. More water is poured out through the pores in the skin during hot weather than in cold weather. This water evaporates from the skin, drawing away heat as it evaporates. That is how perspiration helps to cool the skin.



WATER IN FOOD

The white part shows the amount of water. About how much of each of these foods is water?

There is a large amount of water in the food you eat. The pictures on this page show how much water there is even in foods that seem dry. Milk, soup, fruits, and vegetables supply a large amount of water. In addition to the water in foods, you probably need at least four glasses of water a day.

Some people say that drinking large amounts of water will prevent kidney disease. There is no proof of this. In fact, forcing yourself to drink more than the average of three to six glasses a day may put extra work on the kidneys. The most healthful thing used in excess may become harmful. "Nothing in excess" is a good rule, you know. It is usually a good plan to drink a glass or two of water when you get up in the morning, another glass in the middle of the morning, and still another glass in the middle of the afternoon.

Drinking water at meals in the proper way aids digestion. Drinking water with meals aids the tissues in satisfying their need for water. Perhaps you have heard people say that you should not drink water with your meals. This is not true. Water at meals is harmful only when it is used to wash down partly chewed food.

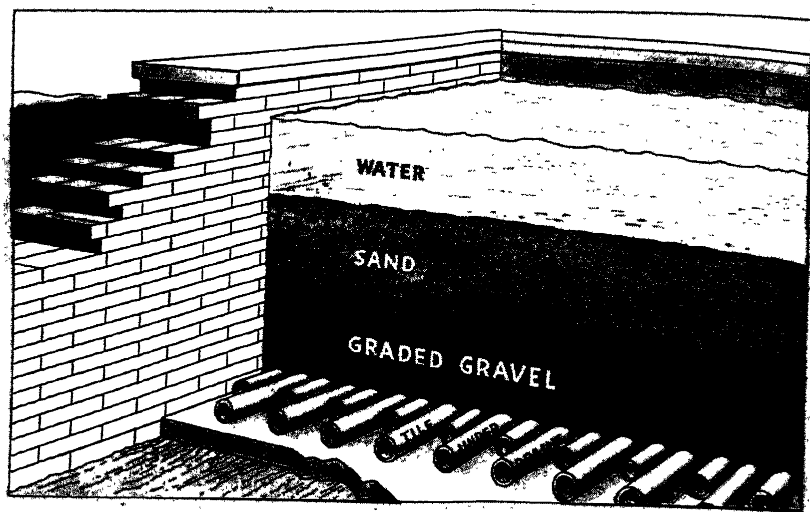
HOW TO HAVE A SAFE WATER SUPPLY

How much does a glass of water cost? Some of you will answer, "Nothing." That is true in a few places where safe water bubbles up from a spring. But in almost every place water costs something. The story is told of a merchant traveling through the desert who, when his water supply was gone, paid for a drink of water in diamonds. The glass of water that you get from your own well or pump costs very little—just a fraction of the first cost of the well or pump. Perhaps your father pays a water tax. Ask him whether he does. This tax helps to pay the cost of providing safe water for all the people.

Where can you get safe water? Since everyone must have water, it is very important to make it safe, no matter how much it costs. Safe water is always cheaper in the end than sickness. Bacteria that cause disease find their way into drinking water in hundreds of ways. But there are just as many ways of guarding against them. The town or city or county government plays a part in making water safe. The school has its responsibility. Your father and mother have a part to play. You have a share, too, in securing safe water.

If you live in a city, you depend upon the city to supply safe water. All cities today make sure that the water is safe to drink. Most cities *filter* * the water and treat it with chlorine. Filtering strains out dirt of all kinds. Chlorine kills bacteria quickly. You can sometimes taste the chlorine in the water of cities that use it to make water safe. But commonly city water tastes like cool spring water from high up in the mountains.

The school has an important responsibility in provid-



The sand and gravel strain out dirt. After the water filters down into the tiles, it may be treated with chlorine. Such water is usually safe and clean.

ing safe water for pupils and teachers. In the first place, a safe source of water must be found. In the second place, the water must be used in a safe way. Two safe sources of school water are a city supply and a good well. The city water supply has already been described. A carefully built well is one that will not let dirty water drip through the cover or slip in at the sides. A well should not only be carefully built; it must also be so placed as to avoid *pollution* * from toilets and barnyards.

The deeper the well, the more likely the water is to be safe. Do you see how wells that obtain their water close to the surface of the ground might be unsafe? Wastes from the bodies of people are sometimes buried in or thrown on the ground. These wastes may contain bacteria that cause disease. The rain falls on the earth. It carries impurities down into the ground with it. The

water in a shallow well is likely to contain bacteria which have been washed into it. But as the water oozes farther and farther down into the earth through layers and layers of sand and other kinds of soil it loses its load of bacteria. The sand acts as a filter and strains out the bacteria. That is why deep wells are likely to be safer than shallow wells.

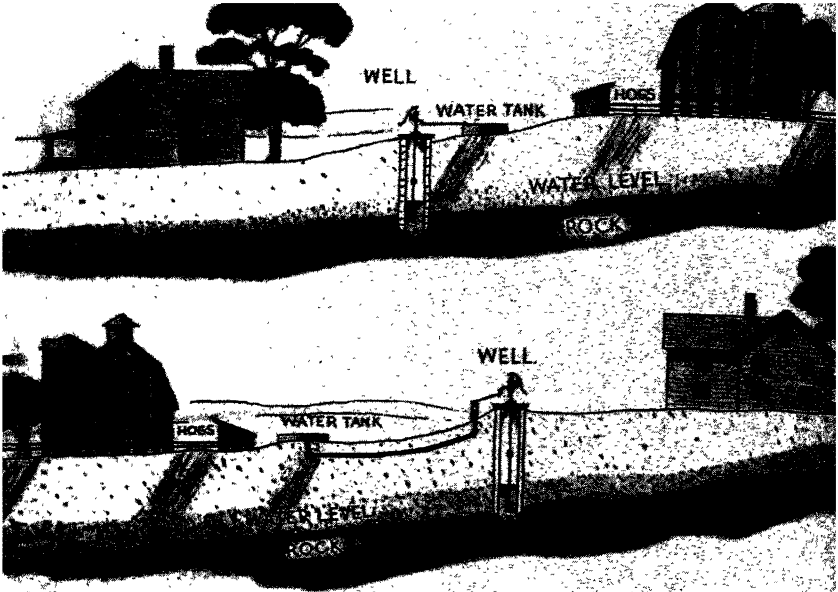
After the school has secured safe water, it should be careful to keep it safe. Every child should use his own cup. Paper cups, which can be used by one person and then thrown away, are excellent. If the school has drinking fountains, they should throw the water at an angle—not straight up in the air. The holes from which the water comes should be guarded by a heavy wire so that as children drink their lips cannot touch the bulb. Can you give reasons for these two requirements of a sanitary drinking fountain in the school?

The school should provide soap and water for washing the hands before lunch and after going to the toilet. Individual towels should also be provided. The old-fashioned roller towel spreads bacteria. Paper towels are more sanitary for school use.

No school is a truly up-to-date school that does not provide safe water for drinking and washing.

At home, as at school, there should be a safe water supply used in a sanitary way. People used to drink water from rivers, but they found that they were often drinking, at the same time, bacteria which cause disease. Typhoid fever has often been spread by sparkling river water. The number of cases of typhoid fever has been greatly reduced by making the water supply safe.

The picture on page 80 shows how water may be



Which of these wells is more likely to supply safe water? Find the shaded places that show where the wastes from the barnyard go into the ground.

supplied in the farm home. If you live on a farm, do you have a pump that draws water from deep down in the ground? Is your well placed on higher ground than the cesspool and barnyard? The cesspool is a sort of walled-in hole into which wastes are sent. Toilets in houses often empty into cesspools. Can you picture what might happen if the well was near the foot of a hill and the cesspool was near the top, that is, if the cesspool was higher than the well?

If you are not sure that the water you have is safe to drink, boil it and cool it before you drink it. Water has been made safe in just this way for hundreds of years. Some American families today boil their drinking water, keep it in clean, covered glass bottles or jars, and use it whenever they feel thirsty. In time of floods, when the

IS THIS A CONVENIENT WATER SUPPLY FOR THE COUNTRY HOME?

Do you think this is a good place for the fly swatter? Suggest a better place for it.

water in the public supply or from wells is easily made unsafe, people are warned to boil all water that is to be used for drinking or cooking.

Some people say boiled water tastes flat. This is because the gases and air that give it its usual tastes have been driven off. To take away the flatness, pour the boiled water into a clean container from a height of about two feet. If you have a clean jar with a top that can be fastened on tightly, fill the jar part way, fasten the top, and shake the jar until air bubbles form in the water.

When you go camping or on an all-day walk, are you very careful to have safe water? Sometimes you carry drinking water with you; that is a good plan. You have

learned never to drink from brooks or old wells along the way. That is one of the first rules of camping.

The health departments of a number of states examine water from wells and springs along roads. Safe water is marked by a sign and the name of the department. Why do you want to know who says the water is safe? Would just the words "Safe water" mean much? Next time you go for a ride out in the country look for safe-water signs. Often there is another sign several hundred feet ahead to tell that you are coming to a place where you may safely drink.

Things to Do

1. If you are interested in different kinds of pumps and how they work, look in a catalog of plumbing supplies or in a science book for pictures and descriptions.

2. Read about water supplies in your history and geography books. How do cities near you supply safe water?

WATER TASTES GOOD AFTER A HIKE, BUT ARE THESE BOYS AS WISE AS THE BOY SHOWN ON THE NEXT PAGE? WHY?

1. If you were taking a trip by bicycle or auto on a hot day and you were very thirsty, which of the following would be best to do? Why?

a. Stop and get a drink from a brook or river where the water looked clean.

b. Stop in at a farm house and ask for a drink.

c. Wait until you find water that is marked safe by a state or city health department.

2. If you were moving to a new home in the country, what questions would you ask about the water supply? Ask these questions about the water supply in your present home. Talk over with your father and mother any changes that should be made if the water you drink is not easy to get. Are there any difficulties in the way of your washing your hands before eating and after going to the toilet? If there are, make a plan to overcome these difficulties. Carry out your plan.

THE SIGN MEANS THAT STATE HEALTH WORKERS HAVE TESTED THIS WATER. IT IS SAFE WATER TO DRINK.

THINK BEFORE YOU DRINK! THIS WATER MAY CARRY DISEASE.

3. Study the water supply in your school. How many of these questions can you answer by "yes"? Is it easy to get a drink of water whenever you feel thirsty? Does your school have a well? Is the well at least 100 feet from a toilet and located on higher ground so that the contents of the toilet cannot drain into the well? Has the department of health recently said that the water is safe? If drinking water is carried to the school, is the pail or other vessel kept covered? Are individual drinking cups or is a drinking fountain provided? What chances are there for bacteria to get into the water supply?

Are washbasins, individual cakes of soap, liquid soap, or powdered soap, and clean towels supplied? Are paper towels used? Or does each pupil have a towel?

Are there any changes that you think should be made in your school in order to have a better supply of water for washing and drinking?

4. Why does boiling make water safe? Why is it not necessary for each family to boil their drinking water in a large city such as Chicago?

5. You want to have clean clothes for school every day. Your mother works during the day and it is very hard for her to wash and iron your clothes at night. What can you do about this problem?

6. How might dangerous bacteria get into river water? Draw a series of pictures illustrating your answer.

7. Is the boy below drinking in good form?

Discussion Questions

How many of Martin's sentences (see page 86 also) are correct? If any are not correct, rewrite them correctly in your health notebook.

1. Water is necessary for the digestive, circulatory, and *excretory* * systems.

2. Your body is 80 per cent water.

3. Drinking a great deal of water thins the blood.

4. You cannot drink too much water.

5. You should not drink water at meals.

6. There is little water in most foods.

7. All deep wells are safe sources of water.

8. The main reason you perspire is to rid the body of wastes.

9. Water that looks and tastes good may make you sick.

10. Concentrated urine may irritate the bladder.

11. Alcoholic beverages may harm the kidneys and other organs of the body.

Interesting Books

AHRENS, BUSH, EASLEY—*Living Chemistry,* pp. 121-129

CARPENTER, WOOD, SMITH—*Our Environment, Its Relation to Us,* pp. 216-241

HILLIS—*Trouble on Goose Creek*

KNOX, STONE, MEISTER, WHEATLEY—*The Wonder World of Science,* Book Six, pp. 248-258

MEISTER, KEIRSTEAD, SHOEMAKER—*The Wonder World of Science,* Book Seven, pp. 65-99

RIEDMAN—*Water for People*

WATKINS and PERRY—*Understanding Science,* pp. 106-128

WATKINS and PERRY—*Science for Human Control,* pp. 139-182

UNIT IV

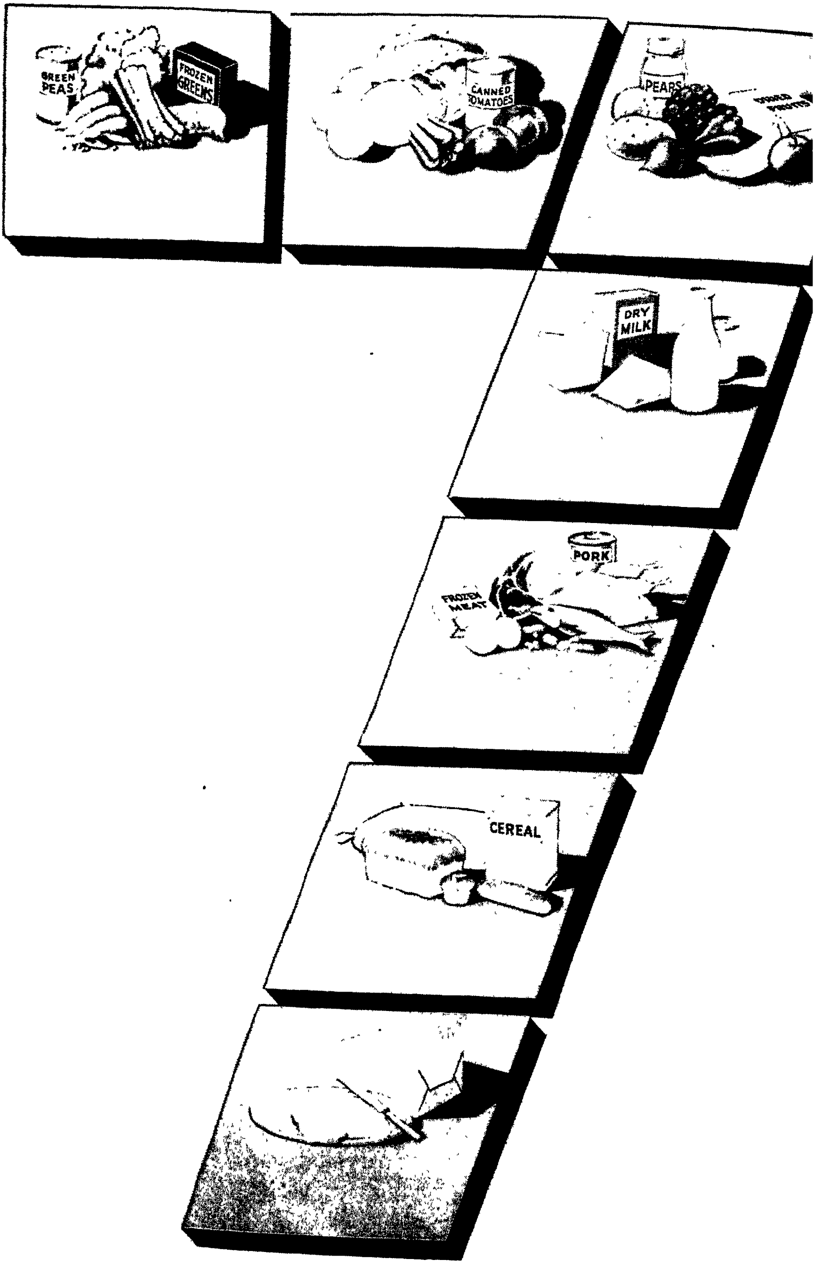
CALORIES * FOR WORK AND PLAY

If you are too fat and want to grow thinner, there are goods ways and poor ways to do it. If you are skinny and want to weigh more, you can try eating the right food. If you lack energy and pep, perhaps you need a better diet.

To help you have the right weight and to feel your best, you should know about calories, *carbohydrates,** proteins, fats, and vitamins. This knowledge will help you in choosing the right kinds and amounts of food as long as you live. What you eat does matter—now or later.

In this unit you will learn more about the seven basic foods and how to match the amount you eat to your size and activity.

Selecting the proper food is an important part of preparing meals.



The seven basic foods

WATCH YOUR WEIGHT

Charles watched his weight but never worried about it. He liked outdoor work and play, had a good appetite, and did not overeat. As he was saving his money to buy a new baseball glove, he did not buy candy or soft drinks between meals. Looking at his picture on page 88, wouldn't you say he was well nourished and just about the right weight?

Kate was very tall and thin. "I'm just plain skinny," she thought. "And I hate to be taller than others my age, especially the boys."

Kate need not worry. In a little while she will probably begin to gain weight. If she does not, she should see whether she is eating enough to keep all her body cell engines running and to store a little of the food she eats as fat.

Dan was worried because he was getting too fat. One day he was listening to the radio. "Eat and grow thin," the Voice said. "Reduce the easy way by taking Doctor Potter's Patented Pills."

"That's nonsense," said Dan. "Even I know that you can't grow thin if you eat a lot. But I wish I didn't like to eat so much."

Sam was different. He really didn't eat too much, and yet he became fatter and fatter. In gym class the boys called him "Square Baby." They usually did not ask him to play with them because they thought he was too fat to be good at baseball or basketball. As a result, Sam felt "left out." He realized he would have to do something about it or he would be without friends.

Sam talked it over with his mother. "Why am I so fat?" he asked. "I don't eat as much as the other kids I know."

"Perhaps there's something wrong with one of the glands that has a lot to do with the way you grow. It's the thyroid gland. If it is working too hard, the fuel you eat is burned up too fast. If it is working too slowly, the fuel you eat is not burned up fast enough and is stored as fat. The doctor has tests that tell how your thyroid gland is working. We'll go to the doctor's and see."

So Sam and his mother saw the doctor. "I'm glad you came," he said, after he had made the tests. "You have a lazy thyroid gland. I'll give you medicine to help it work better. I'll also help you plan your diet."

Some months later Sam said, "I'm just about the right weight now. And, best of all, I'm on the baseball team this spring."

WHEN ONE IS UNDERWEIGHT

It is not necessary to weigh as much as the average boy or girl of your age and height in order to be healthy. Many children whose weight is below average are healthy. Some children who are underweight according to the average weights of other children may be of a slender body build. It may be natural for them to weigh less than the average child. Many boys and girls above average have just the right weight for them. The weight of healthy children depends upon the size of their parents and grandparents, the climate in which they have lived, and many other conditions.

But, if you are more than 10 per cent underweight according to the height-weight tables, a careful exam-

ination by the doctor may show other signs of poor *nutrition,** or *malnutrition* * as it is commonly called. Malnutrition means that the cells of the body are not being supplied with all the substances they need. Malnutrition may show itself in underweight, poor posture, fatigue, lack of color in the lips and cheeks, *flabby** muscles, dry, dull hair, and dull eyes.

Growth is a more important measure of good nutrition than average weight. All healthy young animals and children gain in weight during the year. Average yearly gains in weight for boys and girls are as follows:

	AVERAGE YEARLY GAIN IN POUNDS	
AGE	FOR BOYS	FOR GIRLS
10 years	6	8
11 years	7	10
12 years	9	13
13 years	11	10

But, as you already know, there are great differences in the way boys and girls of the same age grow.

What are the causes of underweight? Some boys and girls tend to be thin because their fathers and mothers are thin. Their grandfathers and grandmothers also may have been of a slender body build. So the children *inherit* * a *tendency* * toward thinness. Some children belong to a people of small, healthy, slender build.

But there is a difference between being slender and healthy and being thin and unhealthy. The person who shows signs of malnutrition may need to build up his weight no matter what his family tendencies may be.

Illness and such physical defects as diseased tonsils, *adenoids,** or decayed teeth are sometimes causes of

underweight. Lung, heart, and kidney troubles may result in loss of weight.

Some people worry about everything and get angry and excited about little things that really do not matter. Worry and other *emotional* * disturbances, such as anger, fear, and disappointment, use up energy that might have been used in building the body. Happiness and contentment help to build body cells.

Do you remember learning that emotional disturbances like fear and anger hinder digestion? Emotional disturbances often cause a person not to eat or chew his food well. Anger and fear slow the action of the digestive juices. They make a person feel tired afterward. Worry and discouragement also make him tired. His blood does not circulate so rapidly. He uses less oxygen when he is feeling sad and tired.

A common cause of malnutrition is eating the wrong kind and amount of food. Sometimes bad eating habits are due to poorly planned meals; sometimes, to lack of appetite. Some boys and girls take away the appetite for wholesome foods at mealtimes by eating candy and sweets between meals. Others have no appetite because they do not have enough fresh air night and day.

Some boys and girls fail to gain weight because they eat too quickly and at irregular times. When they do so, they prevent their bodies from making the best use of the food they eat. Some boys and girls do not gain in weight because they exercise too much or keep late hours. Going too often to the movies or to late parties in the evening prevents them from getting enough sleep and rest. Their body cells do not have a good chance to be rebuilt and recharged with energy.

Some families do not have money to buy enough food and milk. Sometimes the food money is not spent wisely. In later parts of this book you will find ways of getting the most and best food values for the money you have to spend. Scientists have found, however, that many malnourished children come from well-to-do homes. These children have poor eating habits or are suffering from some of the other causes of underweight.

There is no one cause of malnutrition. Any or all of the causes mentioned may prevent boys or girls from having the best health possible for them.

How can you gain weight? One group of boys and girls asked how they could gain weight during the Christmas vacation. These are the suggestions their teacher gave them:

1. Sleep from about eight o'clock at night to about seven the next morning.

2. Play or work out of doors at least two hours in the morning and two hours in the afternoon.

3. Eat nothing between meals unless you are really hungry and the doctor tells you this extra lunch is good for you. A midmorning or midafternoon lunch of fruit or crackers and milk is the best kind of lunch to choose.

4. Eat your meals at about the same times each day.

5. Allow at least fifteen minutes for breakfast and a half hour for each of the two other meals. Then you will have time to chew your food well. Mixing food thoroughly with *saliva* * makes it taste better, helps to dissolve it, and begins the digestion of starchy foods.

6. Avoid eating rich, very sweet, and highly seasoned foods.

7. Eat three wholesome meals, such as the following:

BREAKFAST

Fruit
A cup of hot cereal with thin cream
Two or three slices of toast or hard rolls with butter
A cup of cocoa or a glass of milk

DINNER

A small portion of meat or fish
One large potato; generous serving of two other vegetables, one of them a green vegetable
Bread or rolls, butter
Fresh fruit or a milk pudding

SUPPER

A large dish of hot cereal, toast, or potato; milk
A raw fruit or vegetable salad
A large serving of apple pudding

8. Try to see the best in persons and in situations.

These are good suggestions to follow throughout the year. The doctor or nurse will be glad to tell you what is especially important to help you gain in weight.

What are other schools doing to prevent malnutrition? In some schools there are special classes for *malnourished* * children. Some of the children make very large gains. In one class a girl gained twenty-two pounds during the year. She was "just skin and bones" when she entered the class.

Every day at the noon hour the boys and girls in these classes eat a hot lunch of green, leafy vegetables, fresh fruits, and all the milk and whole-wheat or enriched bread with butter that they want. After lunch the children lie down on cots and sleep or rest for a half hour. After rest-

ing they play out of doors for fifteen minutes before returning to their classes. At the beginning of the year the boys and girls in these classes are given a health examination by the doctor. Every Wednesday they are weighed and measured. They try to find out the reasons for their gains or losses in weight.

At home the mothers help these boys and girls to get to bed at about eight o'clock every night so that they will have ten to eleven hours of sleep. The mothers encourage the children to play out of doors at least two hours in the sunlight. They give them milk and some green vegetable or fruit at every meal. They do not give them coffee. They sometimes give them a piece of candy near the end of a meal, but never just before or between meals.

The teachers and nurses in charge of these classes say that the boys and girls are interested and want to do everything they can to gain in weight. Many of them are on "the royal road to health" at the end of the year. This kind of class would be good for all boys and girls—not just for those who are undernourished.

Can you explain why it is necessary that all the health habits of malnourished people should be improved? To eat more food or better balanced meals is not enough. It is easy to see why rest and sleep are important. Exercise is also necessary. Flabby fat, as it is sometimes called, is not a sign of health. Firm flesh and well-developed muscles are more desirable. Playing or resting outdoors in the fresh air and sunlight is an aid to growth for all boys and girls. Those who are trying to gain weight need to be careful to stop playing before they become too tired. The right amount of outdoor play gives an appetite for good food.

WHY WE NEED SOME FAT ON US

When your parents start on a day's trip in the car they have the gasoline tank filled. The coal car holds the coal reserve needed by the steam engine. When you go on a long hike you take a lunch. All moving things need fuel reserves.

The body also has its fuel reserve. It stores it in certain places. Fat is the body's fuel reserve. Fat has high energy value. Therefore fat makes a fine fuel reserve for the body.

A healthy person carries a fat supply at all times. If at any time he cannot obtain food, or has to do long hours of hard work, or has an illness, his reserve helps him.

Fat has other uses in the body. One of them is to put padding in places where it is needed. Fat pads in the arches of the feet and in the palms of the hands absorb shocks. A thin person's feet may hurt him because of unpadded arches. We sit on comfortable pads of fat. Very thin people must sit on cushions to be comfortable. The cheeks and the spaces around the eyeball have pads of fat. A thin person has hollow cheeks and sunken eyes.

Still another use of fat is to help keep the body warm. Thin people feel the cold quickly. A person who has a good coat of fat under his skin can enjoy cold weather or a swim in cool water.

WHEN ONE IS OVERWEIGHT

Too much fat is not a good thing to have. Because the heart has to pump blood to the fat tissues as well as to all the other tissues, it may have too much to do. Fat may crowd in at the joints and make their action more difficult. People who are too fat get certain diseases more easily than people who are of the right weight. They tend to have shorter lives. Also they tend to do less while they live because of the extra burden of fat.

A few years ago some girls who were really thin were afraid that they were too fat. They went on reducing diets when they should have eaten more than the average amount of food. As a result they did not have the reserve energy which they needed. Too strict a reducing diet may make a person cross and irritable. He is hungry. His body does not have enough food materials to keep his muscles working at their best. He feels "all played out."

What are the causes of overweight? There was once a very fat boy who went to the doctor to find out why he

was so fat. The doctor first asked about the food he ate.

"What do you have for breakfast?"

"Pancakes and sirup," said the fat boy.

"How many pancakes?"

"Six or seven."

"How big are they? Big as a plate? Big as a saucer?"

"Big as a plate."

"What do you have for lunch?" the doctor then asked.

"Potatoes and sausage and cake and milk."

"How many potatoes?"

"Five or six."

The doctor continued his questions until he found out how much food the fat boy was eating. It was a very large amount of food. In addition to eating his three meals, the fat boy visited his mother's candy store—and he did not simply look at the candy.

"There's nothing the matter with you," the doctor said, "except that you eat too large an amount of food —and your mother owns a candy store."

Eating too large an amount of food is the chief cause of overweight. In addition to eating a large amount of food, some fat people take very little exercise. The fuel food they eat is not used up.

Sometimes a person thinks that, because most of his family are stout, he will be overweight no matter what he eats or does not eat. Once in a while this appears to be true, but in most cases the family are overweight because both grownups and children eat too much and eat a great deal of rich food. The boys and girls who eat the same rich, heavy foods as their parents become too heavy, just as their parents have grown too stout. When these boys and girls change their habits of eating, they

often become about the right weight for their age and height.

A few boys and girls are too fat because certain *glands* * in their bodies are not working properly. Glands are organs that *secrete* * (make and pour out) liquids that are useful to the body. The *salivary glands* * in the mouth, for example, secrete saliva, which helps to digest food. One of the glands that may be related to overweight is the thyroid gland. You may have seen people with a swelling in the front of the neck due to an enlargement of the thyroid gland.

If the thyroid gland is very active—secretes more than the usual amount—the person tends to use up quickly the food he eats. He does not gain in weight. He may get thinner. If the thyroid gland is lazy—secretes less than the usual amount—the person tends to store much of the food he eats and he gains in weight.

There is another gland called the *pituitary gland,** which is found at the lower part of the brain. A certain disturbance of either the thyroid gland or the pituitary gland seems to be one cause of overweight in a few cases.

But the majority of fat people are overweight simply because they eat more food than they use. If the food you eat is not used up in exercise, in the daily work of the body, and in growth, it is likely to be stored as fat.

Why do people eat too much? You will say because they like to eat. They enjoy the taste of food. That is true. People form the habit of choosing rich, fat-forming foods.

People may grow used to eating large amounts of food. Often they do not know that one small piece of candy may contain more calories than a large helping of

vegetables. It is easy to forget to count the calories in the extra pat of butter or spoonful of salad dressing. We shall soon see how candy or ice cream eaten between meals adds to the calories in the diet for a day.

The people who have grown used to large quantities of food can learn to eat more vegetables, which are low in calories, for part of their meals. In this way they can lower the number of calories without feeling hungry.

An experiment made with some chickens showed a third reason for overeating. The chickens were allowed to eat as much as they wanted. Then some hungry chickens were turned into the same pen. As soon as the hungry chickens began to eat, the first ones began to eat again. The same thing happens to people. When you see someone with an apple or a candy bar, your digestive juices begin to flow and you want something to eat. If one person has a second helping at the table, notice how many others follow his example.

Eating may be a way of putting off doing things you do not want to do. For example, Shirley wants to play after school, but she has to do homework. Even though she usually waits to eat until mealtime, she may feel hungry and go to the kitchen for something to eat. In this way she puts off for ten or fifteen minutes the studying she should do. Sometimes persons overeat because they are unhappy.

Are reducing medicine and dieting ever dangerous? In newspapers and magazines you will find a variety of cures for *obesity*.* Many of the get-thin-quick medicines have contained thyroid extract, made from the thyroid glands of animals. This use of thyroid extract may be extremely dangerous. Thyroid should not be given even

by physicians except with great care and close observation of the patient. In many cases these reducing medicines do not cause a loss in weight, and they are often followed by nervousness and other disturbances of bodily processes. Some people who are too fat seem to be willing to do anything to get rid of the excess except to eat a smaller amount of carefully selected foods. One woman who took reducing medicine lost more weight than she wanted to lose. As a result she was under the doctor's care for several months. Other reducing cures consist chiefly of some *cathartic.** Why are these, too, harmful?

It is dangerous to lose weight too quickly. The best authorities give this rule: Do not lose more than two pounds a week. Special reducing diets consisting of only one kind of food, such as skim milk or grapefruit, are silly and harmful. It is not true that drinking lemon juice will reduce weight. Eating grapefruit daily in addition to the regular meals will not make one thin. The only safe reducing diet is one that contains all the essential food elements. The person who is reducing should merely eat smaller amounts of food high in calories.

What is the right amount of food for us to eat? How much is "sufficient" milk, vegetables, and fruit? Sufficient milk, as you know, is in general a quart a day for growing boys and girls and about a pint a day for every adult. Sufficient vegetables are at least a green and a yellow vegetable every day in addition to potatoes. There should also be a serving of a raw green vegetable, such as lettuce, celery, or cabbage. Sufficient fruit includes orange, grapefruit, or tomato and one or two other kinds of fruit if possible.

These kinds of food are needed whether a person

is fat or thin. A thin person needs more food than a fat person of the same age, height, and activity. There is a way of measuring exactly the total amount of food you need each day. You know that length is measured by inches, feet, and other units; that weight is measured by pounds, ounces, and so on; and that volume is measured by pints and gallons. The unit of measure of the power to work and play that food gives us is called a calorie. We shall learn more about calories soon.

Problems to Solve

1. *How to watch your own weight.* Weigh yourself each month. Look at the chart on pages 281-283. Are you overweight or underweight for your age, height, and body build? Make a graph of your own weight, like the one on page 25. How much do you gain each month?

2. *How to be on your guard against "get-thin-quick" cures.* Tell the class about ways of reducing weight you have read or have heard over the radio or TV. Discuss whether they are safe and scientific.

3. *Susan's problem.* When Susan was twelve years old, she suddenly began to gain in weight. All her dresses were too tight. "Oh dear!" she thought, "I hope I'm not going to be fat like Aunt Mary."

"I'm going on a diet," Susan told her father.

"But you are not really overweight, Susan," her father said. "This is the year when you are making big gains in weight. You'll not gain so much next year."

"But I don't want to be too fat now," said Susan.

What should Susan do? (a) skip breakfast? (b) go on a skim-milk diet? (c) eat a smaller total amount of food? or (d) continue to eat the good food she has been having?

4. Look for the word *calorie** in books, magazines, and

newspapers. Bring to class copied sentences and paragraphs or clippings in which *calorie* occurs. Read and discuss your findings.

5. Write the conclusions you can draw from the facts in this section.

Discussion Questions

From John's statements here do you think he is a good person to tell how to gain or lose weight? Why?

1. You cannot be healthy unless you are the average weight for your height and age.
2. If most of your relatives are fat, you will be fat no matter what you eat.
3. On the average twelve-year-old girls gain more in a year than twelve-year-old boys.
4. People who wish to reduce should sleep less and worry more.
5. It is dangerous to use glandular extracts and cathartics to reduce.
6. One rule for reducing is to lose no more than two pounds a week.
7. Diet until you are the correct weight; then eat as you please.
8. Only poor children are malnourished.
9. A calorie is an ounce of food.
10. Fruit juice makes you lose weight.

HAVE YOU ENOUGH ENERGY?

YOUR NEED FOR ENERGY

Outdoor work or play suited to your needs is pleasant and healthful. Fresh air and sunlight on the bare skin are the best kind of tonic.

What kinds of exercise do you take? Before school in

the morning do you go to the store, sell papers, make your bed, go for a run with the dog, play ball, bring in wood, milk the cows, deliver milk, or walk part of or all the way to school? All these activities require energy.

At recess time do you play group games out of doors? This is an excellent way to spend recess. Playing such a game as baseball requires energy.

At noontime do you walk briskly home to lunch and walk slowly back to school after lunch? Or do you have lunch at school and play quiet games in the sunshine? Such games are best after eating. They require energy, too, but not so much as the more active games.

After school do you play out of doors after you have changed to play clothes? What do you play—handball, football, dodge ball, basketball, baseball, deck tennis, volleyball, or others of the more active games? Or do you go for a walk in a park or in the woods? Perhaps you spend the afternoon roller skating in the fall and spring and ice skating and coasting in the winter. Do you spend part of the afternoon working on the farm, cleaning the house, cutting wood, or going to the store? These are healthful ways to spend time after school.

Every season brings its special gift of games and sports. What are the summer sports? The winter sports? The games of fall and spring? A recipe for a healthful Saturday may well include at least two hours of work, two to four hours of play, two hours of rest.

Everything you do requires energy.

WHERE YOUR ENERGY COMES FROM

Where do you get the power to work and play? All energy for playing or working—for exercising in any

way—comes, in the first place, from the sun. But our direct source of energy is our food.

The body is a working machine. It needs fuel to keep it running. Its fuel is food. The food you eat is changed in the digestive tract. It is carried by the blood to the body cells. Some of it is packed away in the cells, to be used as needed. Some of it is burned at once. As the food burns in the body cells, it furnishes power to move. The faster we move, the more fuel is used. The food we eat works like the fuel used in an automobile or airplane engine. But there is this difference: An engine stops working at times; the body never stops working as long as we live, even when we rest.

Heat is a sign that food is being used as fuel. You have noticed of course how warm you become when you exercise. Even on a cold winter's day you feel warm after

you have been walking fast or skating or running a few minutes.

CAN YOU COUNT YOUR CALORIES?

WHAT CALORIES TELL US

How do you know how much food you need for different activities? Most people eat according to their appetites, and appetite is often right. Appetite usually tells you the amount of food you need. You are usually hungry after you have been swimming or skating. Both these sports use up a good deal of fuel. People who work hard out of doors usually have larger appetites than people who do indoor work. Here, too, appetite is right.

But appetite does not always tell you how much food you need. Appetite did not tell the thin child who had nothing but coffee for breakfast that he should eat cereal and milk and fruit. When bad food habits have been formed, appetite often fails to tell you how much you should eat. So, while appetite is often a safe guide to the amount of daily food needed, it is good that there is a more exact way of knowing how much food you should eat.

By means of calories you can tell exactly how much energy you use in your daily work and play and how much energy there is in different foods. Have you ever heard your family talk about calories? How many times did you find the word *calorie* in books, newspapers, and magazines?

Read carefully the table that begins on page 108. Try to answer the questions following the table. Notice the first five items on the list. How do you explain the in-

crease in the number of calories needed from sleeping to standing in a relaxed position?

Why do you need any calories when you are sleeping? What activity is going on even when you are asleep? Yes, the heart is beating. The lungs are being filled with air and partly emptied many times a minute. Records of sleeping children have shown that they often move their hands, legs, and other parts of the body.

Every movement requires fuel food. Calories are spent every time a movement is made. The more vigorous the movements, the more calories are needed. You need a few more calories when you are lying awake than when you are sleeping; more when you are sitting than when you are lying down; and more when you are standing than when you are sitting. You need most calories when you are running fast, skating, swimming, playing baseball, cleaning house, or splitting wood. The more active you are, the more calories you need. The number of calories a person needs depends largely on how active he is.

CALORIES USED FOR MUSCULAR WORK

Form of Activity	*Calories per Pound of Body Weight per Hour*
Sleeping	0.43
Awake, lying still	0.50
Sitting at rest	0.65
Reading aloud or studying	0.69
Standing relaxed	0.69
Dressing and undressing	0.81
Singing	0.89

Form of Activity	Calories per Pound of Body Weight per Hour
Typewriting rapidly	0.91
Light exercise, such as washing dishes	1.10
Walking (2.6 miles per hour)	1.30
Carpentry, metalworking	1.56
Active exercise, such as playing baseball or roller skating	1.88
Walking (3.75 miles per hour)	1.95
Severe exercise, such as handball and lively folk dances	2.92
Swimming	3.25
Running (5.3 miles per hour)	3.70
Very severe exercise, such as climbing a steep mountain rapidly	3.90

Which activities require the smallest number of calories? Which require the largest number? About how many times as many calories do you need when you are swimming as when you are studying? Which exercise takes the most energy? Why did some mothers in Europe during World War II, when they had very little food, keep their children in bed most of the day?

Some of the activities listed may make you more tired than others even though they do not require so many calories. This is because they use certain muscles almost all the time while other activities give some muscles a chance to rest while others are working. For this reason it would be easier for a person to work five hours at building a house than to sing steadily for five hours. But he would spend more calories in the five hours of carpentry.

MANY CALORIES ARE SUPPLIED BY THIS MILK, BREAD, AND OATMEAL

USING OUR KNOWLEDGE OF CALORIES

How can you use your knowledge of calories? If you are thirteen years old and need about 2400 calories a day, you can build three meals that supply this number of calories. Suppose that you decide to have 700 calories for breakfast, 800 calories for lunch, and 900 calories for dinner.

One slice of baker's bread an inch thick will yield 100 calories. A glass of milk filled to within one quarter of an inch from the top will give you 160 calories. If you had nothing but whole-wheat bread and milk for breakfast, how much of each would you need? Two glasses of

milk and about eight one-half-inch slices of bread would count up to about 700 calories. Your breakfast would then consist of:

2 glasses of milk	320 calories
8 slices of bread one half inch thick	400 calories
	720 calories

Two thirds of a small box of graham crackers may be used in place of the bread. One half cup of thick oatmeal yields about the same number of calories as a one-inch slice of bread. You could replace two slices of bread an inch thick with one cup of oatmeal. One level tablespoonful of butter yields 100 calories. You might replace a little less than one half glass of milk by one half tablespoonful of butter. This is a pat about one inch square and a quarter of an inch thick. What would your breakfast then be?

Your lunch or supper could be built in the same way. The bread might be toasted, more butter added, the milk heated, and fruit added. Then you would have:

Milk toast	
4 one-half-inch slices of bread	200 calories
1½ tablespoonfuls of butter	150 calories
1½ cups of milk	240 calories
Applesauce, ¾ cup	200 calories
	790 calories

You could build a dinner in the same way. One large potato yields about 200 calories; a piece of fish, 100 calories; a dish of lettuce, 5 calories, served with fruit juice and a tablespoonful of olive oil, a total of 105 calories; one half cup of chopped spinach, 20 calories.

One glass of milk could be used to make custard yielding about 200 calories. You would then have:

2 one-half-inch slices of bread	100 calories
2 tablespoonfuls of butter	200 calories
A piece of fish or meat	100 calories
1 medium baked potato	100 calories
½ cup of chopped green leafy vegetable	20 calories
A dish of lettuce with fruit juice and 1 tablespoonful of olive oil	105 caloreis
A large dish of custard	200 calories
A small cookie	75 calories
	900 calories

These three meals add up to 2410 calories. Some people like to have each meal about the same size. Other people have their largest meal in the middle of the day—600 calories for breakfast, 1000 for dinner, and 800 for supper. The best plan is to have about one third of the total number of calories in each meal. Then you will not eat too large an amount in one meal or become hungry and eat between meals. Some fat people who eat very little at meals nibble on candy and other sweets between meals. Candy is so high in calories that they often eat more than their calorie requirement although they think they are dieting.

If your mother or father or older sister or brother is overweight, it may be well to look at the list on pages 114-116 and find the foods they can eat that furnish the fewer calories. To build a pound of body fat requires about 4000 calories. If a person reduces his diet by about 1300 calories, he can probably lose about a quarter of a pound a day.

HOW MANY CALORIES DOES THIS FOOD SUPPLY?

CALORIES IN COMMON FOODS

How many calories do you eat? Many boys and girls have been interested in learning the number of calories in the food they eat. Here is a chance to use your arithmetic. The list of foods on the following pages will tell you the number of calories in some of the common foods.

You will notice that some foods are high in calories. It takes only one or two tablespoonfuls of these foods to yield 100 calories. Find the foods high in calories.

Other foods supply a medium number of calories. One fourth to one half cup of these foods yields 100 calories. Find some of the foods in the list that are only fairly high in calories.

Still other foods yield very few calories. You have to eat two cups or more of these foods in order to get 100

calories. Find a food in the list of which you need a very large dishful to yield 100 calories. Find in the list other foods that are low in calories. Many foods low in calories are high in other food values.

Foods in the following list range from those high in calories to those low in calories.

	AMOUNT OF THE FOOD NEEDED TO FURNISH 100 CALORIES [1]
FATS AND SWEETS	
Peanut butter	1 tablespoonful (scant)
Mayonnaise dressing	1 tablespoonful
Butter	1 tablespoonful
Sweet milk chocolate	piece $2\frac{1}{4}$ x 1 x $\frac{1}{8}$ inches
American cheese	$1\frac{1}{8}$-inch cube
Cream (thick)	$1\frac{2}{3}$ tablespoonfuls
Cream cheese	piece 2 x 1 x $\frac{3}{8}$ inches
Sugar, granulated	5 teaspoonfuls
MEAT AND FISH	
Hamburg steak (broiled)	1 cake $2\frac{1}{2}$ inches across, $\frac{7}{8}$ inch thick
Beef, round, lean pot roast	1 slice $4\frac{3}{4}$ x $3\frac{1}{2}$ x $\frac{1}{8}$ inches
Eggs in shell	$1\frac{1}{3}$ eggs
Chicken meat, without bones	$\frac{1}{4}$ cup
Cooked bacon	4-5 small slices
Fish (halibut steak)	piece 3 x $1\frac{1}{4}$ x 1 inches
CEREALS AND BREAD	
White flour, sifted	4 tablespoonfuls
Oatmeal, cooked	$\frac{1}{2}$ to $\frac{3}{4}$ cup

[1] These figures are taken from Mary Swartz Rose, *Feeding the Family*, pages 321-348; The Macmillan Company. You can find the number of calories in many other foods in that book and in other nutrition books.

	AMOUNT OF THE FOOD NEEDED TO FURNISH 100 CALORIES
CEREALS AND BREAD	
White bread	2 slices 3 x 3½ x ½ inches
Rolls, French	1 medium roll
Graham crackers	2½ crackers 2½ x 2¾ x ¼ inches
Macaroni and cheese	⅜ cup
Puffed rice	1⅔ cups
MISCELLANEOUS FOODS	
Cottage cheese	5 tablespoonfuls
Baked beans	⅓ cup
Cup custard	⅓ cup
Ice cream	¼ cup
Cocoa made with milk	½ cup (scant)
Baked apple	½ large apple
Apple pie	About 1/18 of a medium-sized pie
Prunes, dried	4 medium-sized prunes
MILK	
Whole milk	⅝ cup
Buttermilk	1⅛ cups
FRUITS	
Apple, raw	1 large apple
Orange, whole	1 large orange
Orange juice	¾ cup
Blackberries, fresh	1 cup
Banana	1 medium banana
Peaches, fresh	2 medium peaches
Concord grapes	1 large bunch
VEGETABLES	
White potato	1 medium potato
Peas, cooked	¾ cup

VEGETABLES	AMOUNT OF THE FOOD NEEDED TO FURNISH 100 CALORIES
Carrots	4-5 young, 3-4 inches long
Asparagus, fresh	20 stalks, 7½ inches long
Tomatoes, canned	2 cups
Tomatoes, fresh	2-3 medium tomatoes
Celery	4 cups of ¼-inch pieces
Lettuce	2 large heads

All real foods supply some calories. Coffee and tea without milk or sugar yield no calories. They are not foods. A lunch of two cheese or egg sandwiches, a glass of milk, and an apple or other fruit supplies about 600-700 calories. This is an average amount of food for the lunch of a boy or girl of your age.

Things to Do

1. Make a calorie exhibit. Measure carefully the amount of each food and write on a card the number of calories in each kind of food. Arrange the foods on a table. Put the foods having the largest number of calories at one end of the table and the foods having the smallest number of calories at the other end of the table.

After the exhibit arrange these foods in a series of breakfasts, dinners, and suppers. Build first the cheapest, most simple breakfast, dinner, and supper that will give you the kind of food and the number of calories you need. Then add a greater variety of foods.

If you cannot bring the real foods to school, make an exhibit using pictures of food.

2. Continue to look for information about calories in newspapers and magazines and bring the clippings you find to school. After you have told the class about them,

put them on the bulletin board. Later put them in the class health file under the heading "Calories."

3. Learn to work in a group. Which of the following persons makes a good member of a group? A person who—

a. wants everyone to do what he suggests.
b. gets angry if he can't have his own way.
c. gives the group any good ideas he has.
d. makes other members feel happy and needed.
e. does all the planning for the group.
f. does his share of the hard work.
g. feels badly and stops helping if his idea is voted down.
h. helps others to work out their good ideas.
i. wants the leader to take all the responsibility.

4. From the luncheon *menu** here and on page 118 choose a lunch that has about 800 calories and is also a lunch that you would like to eat:

LUNCHEON MENU

Cream of asparagus soup	200 calories
1 roll	100 calories
1 square of butter	50 calories
Bottle of milk	160 calories
Fruit salad	200 calories
Peas	50 calories
½ cup of spinach	25 calories
Potato	100 calories
Lamb chop	150 calories
Beets	50 calories
Cookie	75 calories
2-3 graham crackers	100 calories
Hot chocolate	150 calories
Baked apple	200 calories
Stewed apricots	100 calories

Ice cream	200 calories
Chocolate layer cake	200 calories
Banana	100 calories
Orange	75 calories
Apple	100 calories
Popcorn roll	25 calories

8. What conclusions can you draw from the facts in this section? Write them.

9. Answer the following questions and prove your answers from the table on pages 108-109. Who will need the larger number of calories if the two people who are compared have the same height, age, and weight and spend the rest of the day in the same way?

A man who works as clerk in a store or a farmer

A woman who does her own housework or a woman who sits at an office desk all day

A woman who sews or a woman who washes and irons clothes for her living

A girl who is athletic and plays many kinds of outdoor games or a girl who likes indoor amusements best

A boy who is in training on the football or baseball team or a boy who spends his free time reading

A storekeeper or a day laborer

A girl who walks to school or one who rides to school

10. Keep a record for a week of the time you spend outdoors in the sunshine. Discuss your record in class.

Make the Right Choice

Helen has given you three choices of ways to complete her sentences. Read each sentence with its choices carefully and tell which ending makes the statement correct.

1. The direct source of our energy is exercise.
   food.
   the sun.

2. Quiet games are best in the morning.
at recess.
after meals.

3. You need the most fuel from food when you are
playing ball.
sleeping.
studying.

4. If you are thirteen years old, you need about
800 calories each day.
2400 calories each day.
3000 calories each day.

5. You need most calories when you are lying down.
swimming.
walking.

6. An average lunch of about 300-400 calories is
600-700
800-900
usually needed for a boy or girl of your age.

7. The best way to plan your calories for the day is to have ¼ in the morning, ½ at noon, ¼ at night.
about ⅓ at each meal.
¼ in the morning, ¼ at noon, ½ at night.

8. There are about 100 calories in
1 cup of canned tomatoes.
1 tablespoonful of butter.
1 cup of baked beans.

9. A glass of milk and two ½-inch slices of bread give you about 100 calories.
720 calories.
260 calories.

10. A good dessert for a person who is trying to keep his weight down is a baked apple.
a peach.
a piece of apple pie.

WHAT FOOD SUBSTANCES SUPPLY CALORIES?

People all over the world need energy for their activities. Energy, which is measured by calories, is supplied by fuel foods. There are calories in all foods, but people in different countries get their fuel from various kinds of foods.

The Eskimo in the cold North eats several times as much meat as most people in warmer countries. An active young Eskimo may eat as much as nine pounds of seal meat a day when it is easy to get. An Eskimo boy is as likely to eat two pounds of meat a day as an American boy is to eat two ounces. In parts of India and China, on the other hand, most of the people eat very little meat. They get their power to work largely from rice and fish. In warm countries vegetables, fruits, and grains are so plentiful and cheap that they are used to supply energy.

Most people in the United States use mixed fuel. They get their power for work and play from cereals, bread, milk, meat, and other kinds of food. A mixture of substances in foods is the best source of power for people who live in temperate climates.

Last year you studied something about choosing good lunches. Do you remember the Basic Seven? This is a good time to review what you learned about them.

CARBOHYDRATES

Which food do you eat most often? Some of you will say, "Bread." Bread, as you know, is made of flour. Mix a heaping tablespoonful of flour with a little water until you have a ball of dough; then put the ball of dough in a

Recreation is an important part of daily life.


GOOD SOURCES

piece of cheesecloth and squeeze it in a cup of water. In the cheesecloth bag you will find a tough, grayish substance. In the bottom of the cup, after a few minutes, you will find a white powder.

You have seen the white powder before if you have made cornstarch pudding or have starched clothes. The white powder is starch. Ask your mother for a tablespoonful of cornstarch. Pick up a pinch of it in your fingers. How does it feel? Mix a little of it with cold water. Put it on the stove to boil. What happens? Write in your health notebook the facts you found out about starch.

Starch is a *carbohydrate*. Can you guess from the name *carbohydrate* two of the elements of which starch is made? Carbon and hydrogen. That is correct. But carbohydrates are made of three elements—carbon, hydrogen, and oxygen. *C* stands for *carbon, H* for *hydrogen,* and *O* for *oxygen*. There are usually two parts of hydrogen and one part of oxygen, as in water. Carbohydrates, such as starch, are formed in the green parts of plants from the carbon dioxide of the air under the influence of the sun.

Some of the foods richest in carbohydrates are cereals, bread, macaroni, potatoes, bananas, dried beans, sugar, and sirups. Some of the carbohydrates, such as potatoes, cereals, and beans, are the cheapest sources of calories. Because carbohydrates are cheap and plentiful in most places, they often form the bulk of the people's diet.

Carbohydrates are high in calories. That is why they are often called fuel foods.

PROTEINS

Do you remember the other substance you found in flour—the tough, grayish substance in the cheesecloth

of egg, which is chiefly *albumin,** is practically pure protein. We now know that not all proteins are exactly the same. It is believed that the best diets supply proteins from both animal and vegetable sources. It is therefore wise to include meat, milk, and beans or peas in the diet. You do not need all of these each meal or each day, but you may use one source one day and another the next. The amount you have to spend will make a difference as to which foods you choose.

Study the following figures, which show the amounts of proteins in some of our common foods.

FOOD	APPROXIMATE NUMBER OF GRAMS OF PROTEIN
Milk, 1 glass	8
Beef, medium fat, ¼ lb.	22
Bread, 1 small slice	2
Potatoes, 1 medium-sized	2½
Egg, 1	6⅓
Oatmeal, cooked, ¾ cup	4
Peas, fresh, ¾ cup	7
Cheese, 1⅛-inch cube	6½

These are average servings. In which serving would you get the largest amount of protein? How many slices of bread would you have to eat in order to get as much protein as you would get from one glass of milk? One quart of milk supplies as much protein as each of the following foods: 6 ounces of round steak, 4.3 eggs, or 8½ ounces of chicken.

One quart of milk yields about 680 calories. Almost the same amount of energy would be supplied by 10 eggs, 14 slices of white bread one half inch thick, or 4½ slices

of beef three fourths inch thick and two and one half inches square (a little more than a pound of lean round steak). Find the cost of each of these three foods. Which is the cheapest source of energy? If you were planning a day's food for a very poor family and for a family that had plenty of money to spend for food, in which diet would you use the larger percentage of calories from carbohydrate foods? Why?

FATS

Everyone knows what *fat* is. That is not a new name to you, as perhaps *proteins* and *carbohydrates* may have been. Fats and carbohydrates are both made from the same three elements—carbon, hydrogen, and oxygen. Notice the ways in which carbohydrates, fats, and proteins are alike:

Carbohydrates:	carbon, hydrogen, oxygen
Fats:	carbon, hydrogen, oxygen
Proteins:	carbon, hydrogen, oxygen, nitrogen

But these elements are present in different amounts, so that fats and carbohydrates are different in appearance, taste, and food value. This is true of many other substances. Carbon dioxide and *carbon monoxide,** for example, both contain carbon and oxygen. But the first contains one part of carbon to two parts of oxygen (CO_2), while carbon monoxide contains one part of each element (CO). Carbon dioxide is necessary for life. We breathe it in and out all the time. Carbon monoxide is a very poisonous gas.

Why is fat needed? You would expect fats, like carbohydrates, to furnish energy. And they do. Fats supply

Problems to Solve

1. Why are so many people in the world poorly nourished? Here are some of the reasons. What do you think can be done about them?

a. Much skim milk is thrown away. This wasted food would supply enough protein and calcium for many million persons.

b. People want white bread and cereals instead of whole-grain cereal and bread. Unless the white bread and cereal are enriched, they do not contain enough minerals and vitamins. This is important, because about 70 per cent of the total calories in the world's diet is obtained from cereals—rice, wheat, corn, and other grains.

c. People do not eat enough green and yellow vegetables.

2. Is your diet low in these foods: milk, whole-grain cereals and bread, green and yellow vegetables? Make a survey of the food you eat during a week. If your diet is poor, what can you do to improve it?

Discussion Questions

Discuss the following sentences, which David has prepared. Correct any mistakes he has made. (Do not write in this book.)

1. Carbohydrates are often called fuel foods.
2. All foods contain protein.
3. Butter, olive oil, and nuts are rich sources of carbohydrates.
4. The white of egg is almost pure fat.
5. Fats supply almost twice as much energy per gram as carbohydrates supply.
6. Bone marrow is often about 96 per cent protein.
7. Carbohydrates contain nitrogen.

8. One quart of milk supplies more protein than four eggs. (Check your answer with the list on page 125.)

9. Football players should eat only "energy foods," that is, foods that are high in calories.

10. Working and playing out of doors gives a person an appetite, and a good appetite makes him eat the larger number of calories he needs.

11. Sirup, bread, cereal, and dried beans are rich sources of protein.

12. Starch is a carbohydrate.

13. One slice of bread supplies more protein than one egg.

14. One fourth of a pound of meat supplies about the same amount of protein as three eggs do.

Interesting Books

AHRENS, BUSH, EASLEY—*Living Chemistry*, pp. 163-168

BRANDWEIN and others—*You and Your World*, pp. 117-148

CARPENTER, WOOD, SMITH—*Our Environment, Its Relation to Us*

EVANS—*Let's Cook Lunch*

FITZPATRICK and BAIN—*Living Things*, pp. 209-214

MEISTER, KEIRSTEAD, SHOEMAKER—*The Wonder World of Science*, pp. 116-130, 194-197

WILLIAMS-ELLIS—*The Puzzle of Food and People*

WHAT ARE VITAMINS GOOD FOR?

When you turn on the radio, you often hear the word *vitamin*. Radio announcers may tell you, "One a day of our vitamin pills is all you need."

When you read advertisements in newspapers and magazines, you often see the word *vitamin*. Advertisers may tell you, "Important vitamins are in our product. *Thiamin,** calcium, iron, and other vital elements give it high nutritive value."

If you read the printing on boxes of food or on food wrappers, you may see something like this: "Contains vitamins: A—400 I.U., B_1—1 mg., B_2—2 mg."

Do you know what vitamins are, how they were discovered, why they are important, and how you can get all the vitamins you need every day? You can learn all this in this unit.


FOR WHICH VITAMINS THESE FOODS
ARE BEST SOURCES

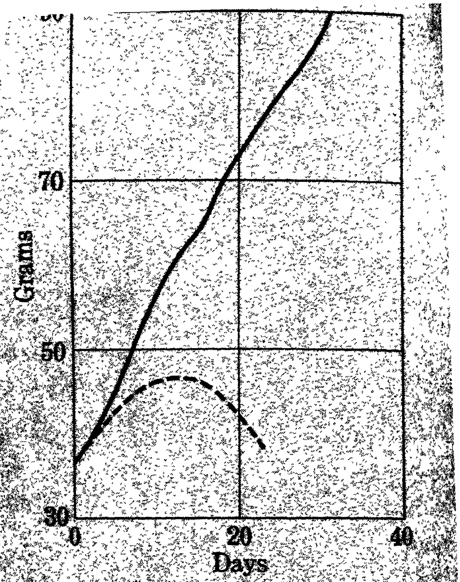
MEET THE VITAMINS

Less than forty years ago it was thought that carbohydrates, proteins, fats, and minerals were the only food substances necessary for health and growth. In one way and another scientists learned that there were other substances in food that were necessary for health and growth. These substances were named *vitamins* from the word *vita,* which means *life,* for the scientists knew that these substances were necessary to life.

Some day we shall know much more about vitamins than we do now because scientists are experimenting all the time. Following are a few short stories telling how these unknown food substances were discovered and how their sources were made known.

Scientists in our own country studied three groups of cattle. All the groups had the same amounts of proteins, carbohydrates, fats, and minerals in their diets. But the first group ate only the wheat plant, the second group only the oat plant, and the third group only the corn plant. After eating these different plants for about a year the young calves, which were alike at the beginning of the experiment, began to look different. The corn-fed cows were sleek and healthy. They had calves of normal size and so strong that they could stand within an hour after they were born. All lived and grew. The wheat-fed cows were thin. They had rough coats. They were smaller than the corn-fed cows. Their calves were small, and none lived. The group fed on the oat plant were midway between the other groups.

What made the differences in these three groups? The



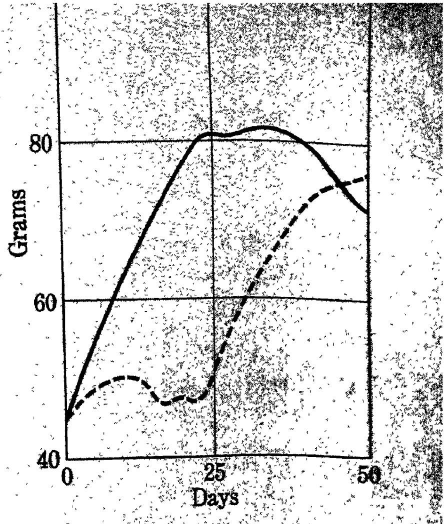
[illegible] OF RATS WITH AND [illegible] THE VITAMINS FUR- [illegible] BY MILK

[illegible] line shows the [illegible] rats having no milk in [illegible] The solid line shows [illegible] similar rats having [illegible] with a small amount [illegible] added. What difference [illegible]

scientists were puzzled. "There must be an unknown substance in the thick green leaves of the corn plant that is lacking in the other plants," they thought. That unknown substance was later found to be one of the vitamins. It was named vitamin A.

A great English scientist proved still more clearly that there are substances other than proteins, carbohydrates, fats, and minerals that are necessary for growth and health. He fed six white rats all of the then known essential food elements. The broken, curved line in the graph on this page shows that the rats grew in weight at first. But after about fifteen days they began to lose weight. Six other rats just like the first group at the beginning of the experiment were given a small amount of milk in addition to the diet given to the first group. The solid black line in the graph shows how fast the

The broken line up to the eighteenth day shows the growth, during another experiment, of white rats on a diet without milk. The solid line shows the growth of similar rats on the same diet with milk added. On the eighteenth day milk was added to the diet of the first group and taken away from the other. What changes in weight took place?



second group of rats grew. They increased in weight steadily as long as the experiment lasted.

But was this difference in growth really due to the fact that one group had milk and the other group did not? In another experiment the scientist added milk later to the diet of one group and took it away from the other. The growth lines in the graph on this page show what happened. The group that had grown so fast when they had had milk stopped growing soon after the milk was taken away. After a week or two they began to lose weight. The group that had lost weight on the milkless diet began to gain rapidly soon after milk was added to their diet. The scientist saw that there must be an unknown substance in milk which was making these differences in growth.

Many other tests followed these early experiments. All showed more and more clearly that unknown substances in fruit, vegetables, milk, cod-liver oil, liver, and

certain other foods were necessary for health and growth. These substances are vitamins.

Most is known about four vitamins. These four vitamins are commonly called by the letters of the alphabet —vitamin A, vitamin B, vitamin C, vitamin D. They also have scientific names, which you may have heard. Vitamin B, once thought to be a single vitamin, has proved to be a family of at least twelve vitamins.

Other vitamins have been found, and still others are being found. Vitamin E and two members of a new vitamin K family are the most recent additions to the vitamins we now know.

VITAMIN A

Vitamin A is a thick, light-yellow oil. Animals can manufacture it from a yellow, orange, or red substance found in yellow, orange, and green vegetables.

Vitamin A is necessary for growth. Two rats that in the beginning of an experiment were of like age and size and equally healthy were given the same kind of food, with the exception that one rat received 5 per cent of cottonseed oil and the other 1.5 per cent of butterfat instead of cottonseed oil. The diets were alike in all other ways. The rat that had butterfat grew faster and was far healthier. Butterfat supplies vitamin A. Cottonseed oil is lacking in vitamin A. Without vitamin A young animals cannot grow.

Other experiments showed that animals did not grow when lard or olive oil was added to their diet of pure proteins, carbohydrates, fats, and minerals. They did grow when butter or yolk of egg was added. Scientists could make young animals grow or stop growing, just as

they pleased. If they added butter or egg yolk, the animals began to grow. If they took butter and egg yolk away, the animals stopped growing. It was vitamin A that made the difference.

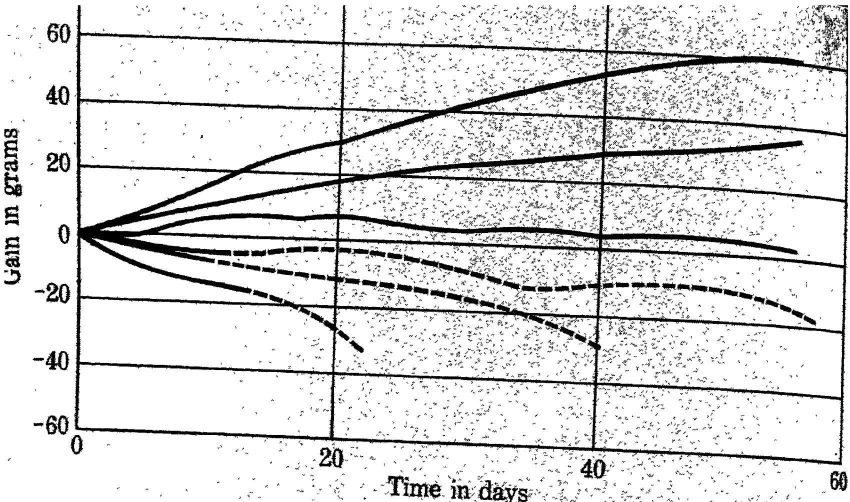
It was also found that animals that lacked vitamin A caught a serious eye disease. They were cured by adding a small amount of cod-liver oil to their diet. The same kind of eye disease occurred among children who did not have enough to eat. They got a disease known as "night blindness." These children were cured by feeding them chicken livers, which are rich in vitamin A. The same disease once occurred among children in Denmark. They were cured by whole milk or cod-liver oil. The disease nearly disappeared in Denmark after butter had been included, by government orders, in the daily diet of the poorer people. It is now thought that lack of vitamin A affects a person's ability to see well after dark.

The lack of vitamin A may lead to *diarrhea* * and other trouble in getting rid of body wastes.

A number of scientists have proof that plenty of vitamin A in your diet may help you to avoid colds and possibly other infections. It is likely that American people, as a whole, do not get enough vitamin A and that a *deficiency* * of it decreases the ability to resist disease.

Even more interesting is the effect of vitamin A on the lives of animals. Generation after generation of animals has been studied. When plenty of vitamin A was included in the diet, rats grew to full adult size; had healthy, lively babies; and lived, on the average, about twice as long as those on a diet equally good in all other respects but having less vitamin A.

Often boys and girls and adults say: "Look at me. I'm



The three broken lines show the effects on growth of rats that had little or no vitamin *A*. The three upper lines show the effects on other rats that had larger amounts of vitamin *A*. What were the effects on weight?

healthy, and I do not eat the right kind and amount of food. Does food really make a difference?" Food does make a difference, but this difference is not always seen immediately. Study the growth records of rats having different amounts of vitamin A on this page and on pages 134 and 135. For a while the young rats on diets having little or no vitamin A seemed about as healthy as the rats having a liberal amount of it. But there was a greater difference as they grew older. The rats on the poorer diet stopped growing. Their children died or were small and weak. The adult rats showed a tendency to have lung disease.

These and many other experiments show that vitamin A is extremely important. It may make the difference between good health and sickness, good growth and lack

of growth, vigor and weakness, healthy babies and sickly babies, a long life and a short life. Vitamin A is necessary for adults as well as for children.

The amount of vitamin A for an average adult is not known exactly, but 5000 International Units are likely to be plenty. An International Unit is a measuring stick used for vitamins A and D, just as a calorie is the measure used for energy.

Which foods contain vitamin A? Any substance that makes all these differences should be worth its weight in gold. But food sources of vitamin A are not costly. Everyone in our country should be able to have plenty of vitamin A, because it is found in our everyday foods. Unlike some of the other vitamins, vitamin A is found in foods from both plant and animal sources. The foods listed on page 140 are the *best* sources of vitamin A.

Which foods contain the largest amounts of vitamin A for a given weight? Which foods are important sources of vitamin A because we use much of them in our daily diet? The amount of vitamin varies from time to time in the same kind of food. The amount of vitamin A in milk can be multiplied by eight by feeding cows oven-dried green alfalfa instead of brown sun-dried hay. Vegetables and fruit that are picked after the sun has been shining are richer in vitamins than those picked in the morning or on a dark day. Green stalks of celery supply about fifty times as much vitamin A as the white, bleached stalks. Green leaves of lettuce supply about thirty times as much vitamin A as the white heads of iceberg lettuce. Some fish-liver oils may have three or four times as much vitamin A as others. One hundred grams of egg yolk may have from 2500 to 5000 International Units of vitamin A.

FOOD	INTERNATIONAL UNITS OF VITAMIN A PER 100 GRAMS OF THE FOOD[1]
Fish-liver oil (average)	200,000
Liver	30,000
Yeast cake	23,900
Green-leaf vegetables	
Parsley	18,000
Beet greens	18,000
Chard	12,000
Dandelion greens	12,000
Kale	10,000
Spinach	10,000
Collards	10,000
Broccoli	9,000
Yellow vegetables and fruit	
Carrots	8,000
Apricots, fresh	5,000
Peaches	2,000
Muskmelon	2,000
Dairy products	
Butter	3,000
Yolks of eggs	2,800
Cream cheese	2,500
Yellow corn meal	800

[1] 100 grams = 3.527 (about 3½) ounces.

Yeast cake is rich in vitamins. But it does not give them to the body. It may also steal thiamine from other foods you eat.

You need about 5,000 I.U. of vitamin A daily. Look at the chart above to see how easy it is to get this amount.

FOODS WHICH SUPPLY ABOUT THE SAME AMOUNT OF VITAMIN A (2490 I.U.)

Lettuce, white-leaf	1 small head
Whole milk	$\frac{7}{8}$ cup
Banana	1 medium-sized
Tomato	$\frac{1}{4}$ medium-sized
Butter	2 squares $1\frac{1}{4} \times 1\frac{1}{2} \times \frac{1}{4}$ inches
Egg yolk	$\frac{2}{3}$ yolk
Carrot	$\frac{1}{8}$ medium-sized
Spinach	3-4 leaves
Beef liver	$\frac{1}{4}$ teaspoonful

VITAMIN D

Vitamin D is a twin brother of vitamin A. In fact, it was called vitamin A for a number of years. Pure vitamin D has been produced in laboratories. There are several D vitamins now known.

Vitamin D is necessary for the good growth of bones. Perhaps you have seen children or grown people who were bowlegged. These people as babies probably had had a disease of the bones called *rickets*.* Vitamin D, under certain conditions, prevents and cures rickets. Many mothers know this. They sometimes say to the doctor, "When are you going to begin giving my baby cod-liver oil?" Cod-liver and other fish-liver oils are rich sources of vitamin D. Vitamin D is important in preventing rickets and in building strong teeth and bones. Vitamin D helps the body make use of the calcium and phorphorus in milk and other foods. Thus it aids growth.

Children up to 15 years of age should have about 400 International Units a day. Just how many an adult should have is not yet known.

Vitamin D seems to be found in fewer foods than any other vitamin. Vegetables, fruits, and cereals contain little or no vitamin D. Cod-liver oil and other fish-liver oils are by far the richest sources of vitamin D. Fish, such as salmon, halibut, herring, and sardines, is the next best source. You may wonder how fish from deep in the ocean happen to store up the sunshine vitamin, as D is sometimes called. Floating in the ocean are many tiny plant forms of life that contain vitamin D. Fish eat these and also feed on the tiny animal forms of life that depend upon the plants that have floated in the sunlight. As a result vitamin D is stored in the livers and other parts of cod, salmon, and some larger fish.

Egg yolk, butter, and cream are the other most important sources of vitamin D. Liver may have a large amount of vitamin D, or almost none. Oysters contain a small amount. The following chart shows more clearly some of the *best* sources of vitamin D. Other kinds of foods have less vitamin D than these.

FOOD	INTERNATIONAL UNITS OF VITAMIN D PER 100 GRAMS OF THE FOOD
Cod-liver oil (average)	15,000
Sardines, canned	1,450
Salmon, canned	300
Egg yolk	100
Butter	75
Cream, 20 per cent	50
Liver	17
Oysters	5

In recent years scientists have found that other foods can be made rich in vitamin D. For example, there are

several ways of making milk rich in vitamin D. Now you can buy vitamin-D milk in many places. Does your milkman or storekeeper sell vitamin-D milk? Such milk will protect babies against rickets.

With the help of the ultraviolet rays of sunlight, the body can make its own vitamin D. Babies who have had plenty of sunlight may have good strong teeth and bones even though they have not had butter, eggs, cod-liver oil, or vitamin pills.

Sunlight seems to make all of us feel better and more relaxed. But we must be careful not to get too much of a good thing. Ten minutes' worth of sun is enough at the beginning of the summer season. The ultraviolet rays reflected from water or white sand, even on a cloudy day, can give us a bad burn. Never stare up at the sun even through dark glasses. The heat rays shining into your eyes through dark glasses may hurt the eyes badly.

The ultraviolet rays do not pass through ordinary window glass. A special kind of expensive glass is needed to let the ultraviolet rays through.

Sometimes windows of this glass are used in chicken houses so that the chicks will grow strong even though they cannot run in open yards.

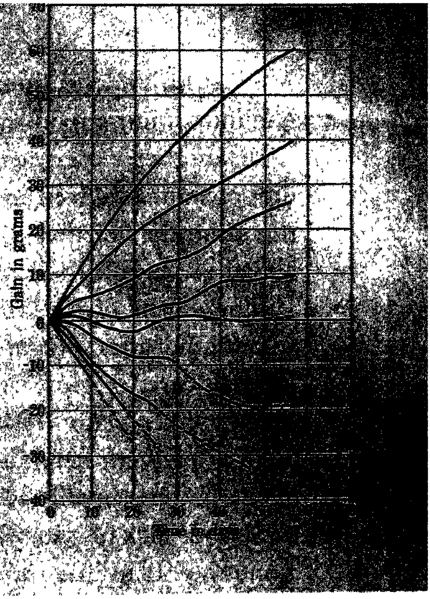
In cities the dust and smoke in the air cut off some of the sunlight. Some people who do not get enough direct sunlight use sun lamps. Your doctor may have a sun lamp. Sun lamps must be used very carefully, and your eyes must be protected from the ultraviolet rays. If you want to use a sun lamp in your own home, you should first ask your doctor about it. Some sun lamps that are sold to be used at home are not of much value, and some may be harmful if they are not used properly. Outdoor sunning is less expensive.

THE VITAMIN B FAMILY

Before vitamin B had a name, it was known as the substance in the brown coats of rice grains that prevents and cures a disease called *beriberi.** Sailors and people on a diet of white rice often used to have this disease.

Again and again it was shown that beriberi could be produced by the use of white rice as food and that it could be cured by the use of brown husks that had been rubbed off to make the rice white. What was the mysterious substance in the brown coats of the rice grains that made the difference between sickness and health? Nobody knew exactly. Much work has been done to discover the chemical nature of this substance.

The earliest experiments showed that the substance scientists then called vitamin B is necessary for growth. The unknown substance in milk which the English scientist (pages 134-135) found made rats grow was later called vitamin B_1. (See growth lines on page 145). Many experi-



This graph shows the effect on the growth of white rats of different amounts of the substance that was early called vitamin B. The lowest line shows the result of having no vitamin B. The downward slant means a great loss in weight. Each of the other lines shows the growth of white rats having more and more vitamin B. How does vitamin B affect weight?

ments have proved that this substance added to an otherwise adequate diet made animals grow and that growth could be stopped by withholding this substance. Even a small amount of vitamin B_1 makes a difference in growth, as is clearly shown by the gains in weight of rats that were fed different amounts of it.

What was at first thought to be a single substance called vitamin B is now known to be at least twelve different substances. At first they were named vitamin B_1, B_2, B_3, etc. These names are still used, but you will now often hear their more scientific names instead.

Vitamin B_1, or thiamin, is a white crystal-like substance that dissolves in water. A lack of vitamin B_1 may be first shown by loss of appetite. Loss of appetite results in less food being eaten. Eating too small an amount of food checks growth. In one experiment this vitamin was added to the regular diet of a group of children. As a

result of this added thiamin the children ate one fifth to one fourth more food than they did before.

In another experiment vitamin B_1 was added to the diet of some children in a school but it was not added to the same diet of the other children. The children with added vitamin learned faster and seemed brighter.

The effects of vitamin B_1 are not shown at once. For some time after vitamin B_1 has been taken away, the animals are bright-eyed, lively, sleek-coated. Then a change takes place. The rats lose weight and stop growing. They seem nervous and jerky in their movements. They become unable to move their legs.

Serious lack of vitamin B_1 affects persons in much the same way. It injures their nerves. They become nervous, sad, quarrelsome, or fearful.

Alcoholics are likely to lack vitamin B_1 because alcohol may crowd out foods that supply thiamin. It may also prevent the best use of thiamin in the body.

It is believed that an average person should have about 450 International Units or 1.5 *milligrams* * of thiamin a day. A milligram is a weight that is only one thousandth of a gram. If you have seen a gram weight, you know what a very small amount a milligram is.

Which foods contain vitamin B_1? Fats and oils and highly refined foods like white sugar and ordinary white bread are poor in this vitamin. Good sources of thiamin are yeast, pork muscle, peanuts, green vegetables, and whole-grain cereals. One lean pork chop or slightly more than one half cup of shelled peanuts will supply the thiamin needed by an adult for one day. When white bread is made from enriched flour, it adds an important amount of thiamin to the day's diet.

The following list shows more clearly the foods that are richest in vitamin B_1, or thiamin. The amount in any food may be more or less than the average amount.

FOOD	MILLIGRAMS PER 100 GRAMS OF THE FOOD
Wheat germ	2.05
Lean pork	1.2
Peanuts, raw	1.2
Ham	1.0
Chard	0.9
Green string beans	0.7
Beef heart	0.6
Oatmeal	0.6
Barley	0.6
Liver	0.5
Rye	0.5
Flour, enriched	0.5
Pecans	0.5
Whole wheat	0.5
Egg yolk	0.4
Skim milk	0.4

Thiamin may be lost if the water in which vegetables have been cooked or soaked is thrown away. Ordinary cooking or canning usually causes a loss of 15 to 20 per cent of the thiamin in foods. This loss is greatly increased if baking soda is added.

Like other members of the vitamin B group, vitamin B_2, or *riboflavin,** is soluble in water, but it is less easily destroyed by heat than is vitamin B_1.

A lack of riboflavin affects the eyes; they become sensitive to light; the person may have difficulty in seeing. A lack of this vitamin may also affect the lips and mouth,

which become cracked and sore. These conditions are cured by giving the person vitamin B_2.

The amount of riboflavin needed by children 13 to 15 years old is 2.0 milligrams a day. Six ounces of liver will supply this amount. Riboflavin is found in small amounts in many foods. Among the best sources are the following:

FOOD	MILLIGRAMS PER 100 GRAMS OF THE FOOD
Liver	3.0
Kidney	2.1
Heart	0.9
American cheese	0.55
Broccoli leaf	0.45
Cottage cheese	0.4
Kale	0.4
Spinach	0.4
Peanuts, raw	0.4
Bran	0.4
Turnip greens	0.4
Eggs	0.3
Lean beef	0.2

*Nicotinic acid,** or *niacin,** is a third member of the vitamin B family. In its pure form it is a white crystal and has a bitter taste. It dissolves in water but is not easily destroyed by acids, baking soda, heat, or light. It was at first called vitamin G.

Nicotinic acid is important for the prevention of a disease called *pellagra.** This disease is sometimes called "rose sickness" because the skin becomes red and perhaps because it occurs more often in the spring and early summer. The person with pellagra has a red and swollen

tongue and cannot swallow his food easily. His digestive system and nervous system are affected.

Pellagra is found among people who do not have enough nicotinic acid. More than thirty years ago Dr. Joseph Goldberger of the United States Public Health Service began to study pellagra. He and his assistants became medical detectives, much like Dr. Walter Reed when he was learning what caused *yellow fever.** Other scientists had shown that pellagra was not carried by insects, as *malaria* * and yellow fever are carried. Yet pellagra seemed to spread from person to person. Dr. Goldberger thought there might be a pellagra germ. He experimented with careless disposal of wastes from the bodies of the sick people. The medical detectives *injected* * themselves with blood and secretions from pellagra patients. None of the scientists who were studying it took the disease.

Then Dr. Goldberger followed a new clew. The people who had pellagra usually planted their land in cotton or other crops that were sold completely for cash. They had no vegetable gardens. Few families had cows. The disease seemed to be more common at the end of a winter of eating corn, hominy, fat pork, and cane sirup. Perhaps it was the poor diet instead of bacteria that made the people break out in the red rash. Experiments proved that Dr. Goldberger was right. When fresh meat, eggs, and milk were added to the diet of children in orphans' homes and in other places where the food had not been well chosen, the children who had been sick recovered. The others did not get pellagra. With fresh foods and well-balanced meals, there was no pellagra.

But this discovery did not help the people who could

not afford to buy much meat and fish. However, peanuts are cheap as well as being very rich in niacin.

The United States Public Health Service has done much to teach the people in the places where pellagra is common that it is important to plant vegetables. The fresh food and greater variety supply needed vitamins.

Other scientists have studied the effects of lack of nicotinic acid on animals, just as they have with the other vitamins necessary for health and growth. Rats fail to grow as they should on a diet that supplies all the known vitamins except nicotinic acid. They begin to gain in weight quickly when they are given a small amount of yeast, which supplies this vitamin.

You can easily see, from the following chart, which are the best sources of nicotinic acid.

FOOD	MILLIGRAMS PER 100 GRAMS OF THE FOOD
Bran, breakfast cereal	19.2
Peanuts and peanut butter	16.2
Liver, calf	16.1
Tuna fish, canned	12.8
Chicken and turkey	8.0
Salmon	7.2
Leg of lamb	5.2
Almonds	4.6
Shredded wheat	4.4
Whole wheat flour	4.3
Roast beef	4.2

About one fourth of a pound of liver will supply all the nicotinic acid needed for one day. The total amount needed at 13 to 15 years of age seems to be about 15 milli-

grams per day. Much more is needed if the person already has pellagra.

Heating does not easily destroy this vitamin. Canned foods are almost as rich in nicotinic acid as are uncooked foods. What other vitamins are nearly, if not quite, as rich in cooked or canned as in uncooked food?

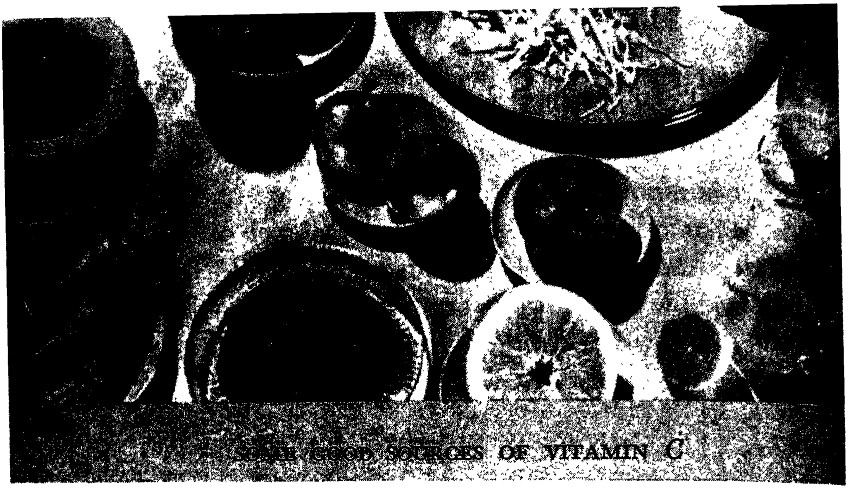
Less is known about the other members of the vitamin B family. You will learn more about them in a few years after more experiments have been made.

VITAMIN C, OR *ASCORBIC* * ACID

Vitamin C is one of the most interesting of the vitamins. Before the Revolutionary War it had long been known that lemon juice, orange juice, and other foods that contain this vitamin in largest amounts would prevent *scurvy* *—a disease very common among sailors years ago. Now vitamin C itself has been secured in the laboratory in the form of white crystals.

Two Norwegian scientists wanted to learn the cause of scurvy. So they studied scurvy in animals and in men. They fed guinea pigs a diet of cereals and bread. The guinea pigs promptly lost weight and showed the same signs of scurvy as did the sailors. They were cured by raw cabbage, dandelions, lettuce, potatoes, carrots, bananas, and apples, which contain vitamin C. The use of vitamin C in preventing and curing scurvy is well known.

The teeth are harmed by lack of vitamin C long before signs of scurvy appear. Two English scientists found that lack of vitamin C caused startling changes in the teeth of guinea pigs. The soft, inner pulp of the teeth dried up. The bony part of the teeth became soft. *Cavities* * appeared. The gums became red and sore. When the guinea



pigs were fed lettuce, orange juice, and other foods containing vitamin C, the teeth and gums became healthy again. In a number of experiments the condition of the mouth was greatly improved by adding orange juice to the diet. Good teeth may depend to a large extent upon vitamin C. Perhaps you may have read in advertisements about that disease of the gums called *pyorrhea.** Vitamin C may help to prevent pyorrhea and bleeding gums.

Vitamin C is also necessary for growth and for building body cells.

Vitamin C forms colorless crystals and is soluble in water. It is destroyed more than any other vitamin when foods are canned or cooked but not when they are frozen.

Which foods supply vitamin C? Fruits and vegetables are the chief sources of vitamin C. It is not found in foods from animal sources. Among the good sources of vitamin C are the juices of lemon, orange, grapefruit, and tomato. Lemon tablets have been taken on polar expeditions.

A serious lack of vitamin C will make you more likely to catch communicable diseases.

The average adult needs about 75-100 milligrams a day. Children need more than adults in proportion to their weight.

From the following chart you can easily see which raw foods are richest in vitamin C.

FOOD	MILLIGRAMS PER 100 GRAMS OF THE FOOD
Parsley	175
Peppers	150
Kale	125
Dandelion greens	90
Brussels sprouts	80
Broccoli	80
Cabbage	60
Strawberries	60
Lemon juice	50
Spinach	45
Liver	40
Grapefruit	40
Orange	40
Pineapple juice	40
Fresh lima beans	40
Tomatoes	30
Green asparagus	30

Some of these foods are important because they are eaten in large quantities and because much of their vitamin is not destroyed by cooking or canning. Some, such as tomatoes, are more important sources of vitamin C than parsley or peppers because we eat more of them. A small orange, half a grapefruit, or one-half cup of tomato juice will supply enough vitamin C for one person

for a day. Potatoes, because they are comparatively cheap and because they are used in large quantities, are a good source of vitamin C.

The vitamin C in tomato juice is not destroyed by heat. Canned tomatoes are almost as good a source of vitamin C as fresh tomatoes. But part of the vitamin C in cabbage, onions, and other foods is lost when they are cooked. There is only about 90 per cent as much vitamin C in cabbage cooked in the ordinary way as in raw cabbage.

VITAMINS IN OUR DAILY FOOD

So little is yet known about vitamins E and K that we need not spend much time on them now. Vitamin E is found in many foods. How important this vitamin is for man we do not yet know.

The two K vitamins are useful to stop bleeding. They make the blood clot more quickly. They are found in the leafy parts of plants.

It would be a good idea now for your class to divide into six committees, each to give a report on one of the vitamins. Each committee should make a chart showing

1. why the vitamin is important
2. which are the best food sources of that vitamin and which of these sources are cheapest
3. any other interesting facts about the vitamin you can find in newspapers and magazines.

Cut pictures of foods out of magazines and seed catalogs, unless one member of your committee is good at drawing the pictures you need. If your charts are clear and correct and your vitamin story lively and dramatic, your committee reports would make a fine assembly program or an exhibit for everyone in the community to see.

Another committee may show how some simple meals supply all the vitamins we need.

BREAKFAST

One orange (A, C)
A whole-grain cereal (B_1, B_2, niacin)
Roll and butter (A, D)
Whole milk (A, B_1, B_2, D)

DINNER

Baked potato (B_1, C)
Broiled fish (A, niacin)
Carrots (A)
Fruit salad (B_1, C)
Bread and butter or fortified margarine (A, D)

SUPPER

Cream of pea soup (A, B_2, niacin, D)
Whole-wheat bread and butter or fortified margarine (B_1, B_2, niacin, A, D)
Cookies

Ordinary white bread and meat make a poor diet. But if you add some milk, butter or fortified margarine, and eggs; green and yellow vegetables; tomatoes, citrus fruits, and other fresh fruits; some cereal or bread made from whole grains, you will have a good diet that will give you enough of each kind of vitamin.

WORKING TOGETHER AT SCHOOL

Learning to work together on your committees is as important as learning about vitamins. Read the following descriptions of a few boys and girls. Which of these would you rather work with? Which would you rather be?

1. *a.* Joan, who says, "Your chart looks funny. Why don't you make it my way?"

or

b. Polly, who says, "That's a wonderful picture of vegetables you found. Do you think it would look better in the center than down in one corner of the page?"

2. *a.* George, who says, "Your chart's all wrong. Look at mine—there's not a single mistake on it."

or

b. John, who says, "Will you help me check the facts on my chart? And we can check yours at the same time. We want to be sure they're all right."

3. *a.* Tom, who says, "Don't ask me to help you. I've got enough to do making my own chart."

or

b. Ted, who says, "Sure, I'll help you. By working together we can get our parts done faster. And say, instead of just giving the facts, couldn't you and I put on a little skit—like a radio or TV show, that would be more fun for us and for the audience?"

4. *a.* Helen, who says, "Oh, I know I promised to bring in that newspaper clipping, but I forgot."

or

b. Sue, who says, "Here's that newspaper clipping you wanted. It will make our report more interesting."

5. *a.* Walter, who says, "Do you call that a carrot! Ha! Ha! If I couldn't draw better than that, I'd quit."

or

b. Dave, who says, "I found a fine picture of carrots in the seed catalogue. Do you want it for your chart?"

LIVING TOGETHER AT HOME

Getting along with your family is just as important as getting along with your classmates. Sarah was worried about this problem.

"When I was little," she said, "I thought Dad was just wonderful. Now I feel differently about him. When my friends come to the house, I feel ashamed of the way he looks and the way he eats.

"And we always seem to be quarreling about something. He won't let me wear lipstick or go out with boys, or learn to dance. Worst of all, he keeps calling me 'baby.' Do I hate that!"

Everyone's feelings toward their family change as they grow up. They should. The trick is to grow up and become more and more independent of the family without making them—or yourself—unhappy.

Which of these boys and girls do you think is handling this situation in the better way?

1. *a.* Sally, who gets angry when her father and mother will not let her go to Katherine's house when they know her parents are not at home.

or

b. Beth, who says to her father and mother, "I guess you're afraid something will happen to me when I'm on my own. Could I ask the crowd here instead so you could see what nice kids they all are?"

2. *a.* Sarah, who is ashamed of her father's table manners and poor clothes.

or

b. Mary, who tells her father about their discussion in school about the importance of good table manners.

> Don't blow on your soup or coffee to cool it.
>
> Finish chewing the food in your mouth before you begin to talk.
>
> Ask for the food you want; don't reach across the table for it.
>
> Cover your nose and mouth with a paper handkerchief if you have to cough or sneeze.
>
> Put your napkin on your lap.
>
> Carry vegetables and other solid food to your mouth with a fork, not with a spoon or knife.
>
> See, I made a chart. I wish you and Mom would remind me to do these things. Soon I'll be doing the right thing without even thinking about it. You know, Dad, good manners are important in making friends and getting a job these days.

Perhaps Mary's dad will begin to learn good table manners, too. But he may say, "When I went to school, we learned reading, writing, and arithmetic—not all this foolishness." If he does, Mary will have to accept her dad as he is, and think, "It is hard for him to change now. I'll just think about all the things I like about my dad—he's kind; he can tell funny stories. Why, there are lots of things I like about my dad!"

1. If you live in the country, try to raise enough green vegetables so that your family will have a green vegetable every day. If your father does not keep chickens, perhaps he will let you raise a few, so that everyone in your family will have an egg every day or two.

2. Make posters showing the best sources of each vitamin—one showing the best sources of vitamin A; another showing the foods richest in vitamin B_1, B_2, and niacin; another showing the best sources of vitamin C; and another showing the best sources of vitamin D. Cut pictures of the foods out of magazines and seed catalogs and paste them on cardboard or heavy paper. Draw pictures of each of the foods, if you wish, instead of cutting out the pictures of them. Which foods are the best sources of almost all the vitamins?

3. Tell your older brothers and sisters about vitamins if they do not know about them.

4. Look for the word *vitamin* in the health columns of newspapers and magazines. See how many clippings about vitamins you can collect. How many advertisements mention vitamins? What do you hear about vitamins over the radio? How many false statements can you find? Can you correct the false statements so that they will be true?

5. At mealtime today tell your family about some of the experiments described in this unit. Give the facts accurately.

6. Look in your school library for books and magazine articles about vitamins. Ask your teacher to tell you some of the best books and articles to read. Tell the class some of the most interesting facts that you find.

7. Which vitamin has been called the sunshine vita-

Problems to Solve

1. If you have checked your diet and find that you are not getting enough of all the vitamins, what are the best ways for you to solve this problem?

Buy vitamin pills.

Ask your mother to buy more green and yellow vegetables.

Raise vegetables if you can have a garden.

Raise chickens if you live in the country.

Try to get liver once a week and milk every day.

Spend your money for fruit, not candy or soft drinks.

2. If a study of the food habits of your community shows that people are not eating enough whole-grain or enriched cereal and bread and green and yellow vegetables, what can you do?

Make posters showing how good these foods are. Ask the storekeepers' permission to put the posters in the stores.

Sell vegetable seeds for people to plant in their gardens.

Help give a quiz program asking questions about food like the ones below and on the next page. This program may be given over the local radio station and the questions and answers later printed in the local newspaper.

QUIZ PROGRAM

Choose the best ending to each of these sentences:

a. Scurvy is due to lack of meat
fresh vegetables and fruit
cereals.

b. You get the most vitamin B_1 in
white bread (not enriched)
polished rice
whole-grain cereals.

c. Vitamin C is present in largest amount in cooked
liver
tomatoes
cabbage.

d. For health and growth you need in your diet
only vitamin A
all the vitamins
only vitamin C.

e. Certain diseases of the eye seem to be caused by lack in the diet of
cottonseed oil
lard
vitamin A.

f. A tendency toward tooth decay seems to be increased by lack of
calories
carbohydrate
vitamin C.

g. People who have pellagra need to add to their diet foods rich in niacin, such as
peanuts
salmon
whole wheat
white corn bread
sugar.

h. Milk supplies all vitamins
most vitamins
vitamin C in large amounts.

i. The best diets include fresh fruits and vegetables
every day
in summer
twice a week.

j. Of these three vitamins the one most easily destroyed by heat is B_2 (riboflavin) C niacin.

Interesting Books

Ahrens, Bush, Easley—*Living Chemistry,* pp. 154-162

Beauchamp, Mayfield, West—*Science Problems,* Book 1, pp. 277-294 and 339-372

Fitzpatrick and Bain—*Living Things,* pp. 214-218

Halbert—*Let's Learn About Goats*

Halbert and Worley—*John Raises Chickens*

Meister, Keirstead, Shoemaker—*The Wonder World of Science,* Book Eight, pp. 144-152

Thomas—*A Fish Pond on the Farm*

Watkins and Perry—*Science for Daily Use,* pp. 415-444

UNIT VI

GETTING YOUR MONEY'S WORTH

Bill's family was holding a family council. His mother and father had just joined Bill and his older brother before the open fire.

"I've just got to have more spending money, now that I'm in junior high school," said Bill. "I have to give to the Red Cross drive, and class dues, and for parties. I have to buy my lunch now. And after school all my friends gather at the corner drugstore. I can't go if I don't have the money to buy a soda or something."

"I know just how it is, Bill," said his older brother.

"But Father said he could not afford to give you a larger allowance," said Bill's mother gently.

"Perhaps there are ways in which we can all save," said Father.

WISE CHOICE OF FOODS

WHICH FOODS GIVE YOU THE MOST FOR YOUR MONEY?

When you go to the food store for your mother, does she tell you exactly what to buy? Or does she sometimes let you decide, what to buy? Boys and girls who learn how to plan meals and buy foods wisely will be better homemakers when they grow up. They will also know how to buy food for hiking and camp trips, for picnics, and for club meetings.

Whether you have a great deal of money or very little, you need to buy the Basic Seven foods for every day. From these foods you can get all the proteins, carbohydrates, minerals, vitamins, and calories you need. This is the first thing you have to think of in buying food.

A careful buyer must know the food values of the food that is sold. Some foods give you much more for your money than others. See the difference in food values between tea and coffee and milk:

TEA AND COFFEE	MILK OR MILK SHAKE	
Water and flavor	Water	Vitamin A
Tea and coffee not only have no food value; they are also stimulating. They often keep people awake when they need rest.	Proteins	Vitamin B_1
	Fat	Vitamin B_2
	Sugar	Vitamin D
	Calcium	Vitamin G
	Phosphorus	Calories

See, on page 166, the difference in food values between fresh fruits and candy made from white sugar:

CANDY	FRESH FRUITS	
Carbohydrates	Water	Vitamin A
Calories	Carbohydrates	Vitamin B family
	Iron	Vitamin C
	Calcium	Calories
	Phosphorus	

Candy supplies many calories, but little else. If you spend all your money for candy, you are not getting your money's worth. If you eat it between meals, you crowd out other good foods. You get more food value when you buy dates and dried fruit candies or molasses candy than when you buy candies made of white sugar and chocolate.

Soft drinks are different in health values. The worst kinds of soft drinks are those, such as the kola drinks, that contain caffeine and *phosphoric acid.** The phosphoric acid of some drinks and the *citric acid* * of the artificial orange and lemon drinks, if these drinks are used often, tend to injure the enamel of the teeth. The best kinds of soft drinks are those that are made of fresh fruit juice or milk. Most soft drinks are nothing but water, sweetened, colored, flavored, and charged with gas. These are the differences in food values between real fruit juices and artificially colored and flavored drinks:

SOFT DRINKS ARTIFICIALLY COLORED AND FLAVORED	ORANGE JUICE	
Sugar	Fruit sugar	Vitamin A
Calories	Iron	Vitamin B family
	Calcium	Vitamin C
	Phosphorus	Calories

More and more persons are using natural fruit juices and milk drinks in place of artificially colored and flavored drinks. Every time you choose fresh fruit juices or grape juice instead of "soda pop" you are encouraging the storekeepers to sell more of the fresh fruit drinks. Every time you choose a milk shake instead of some soft drink you are increasing the sale of the better kinds of drinks. Storekeepers sell the kinds of drinks people want to buy. Your example is important. Other persons will be more likely to choose fresh fruit juices and milk drinks if they see you buying and enjoying them. Which drinks give you your money's worth of health?

A careful buyer knows how to get clean food. For example, if he buys fruit or milk drinks in a drugstore, he knows how they should be served. Some stores use paper cups instead of glasses. A new paper cup is used for each person. Straws served in paper covers are protected from dirt, flies, and other people's fingers. Spoons should be carefully washed. Then they should be rinsed in boiling hot water or steam.

There is danger from bacteria in carelessly washed glasses. In one city 30 per cent of the drinks tested contained disease-producing bacteria. Only when glasses are washed in hot, soapy water and rinsed in clean, boiling water are the bacteria killed. Boys or girls who work any place where food is served should be very careful to wash the glasses, dishes, and silverware in this way.

Your knowledge of food values will help you decide whether to buy beefsteak or liver, carrots or white turnips, broccoli or white celery. If you look back to pages 125, 140, 142, 147, 148, 150, and 153, you will find differences like these in the values of foods:

BEEFSTEAK		LIVER	
Protein	Niacin	Protein	Vitamin A
Fat		Fat	Vitamin D
Calories		Calories	Vitamin B family
Iron		Iron	

A well-known scientist made this simple rule for an adequate diet: A quart of milk a day. Large servings of fruit or raw vegetables, as in salad, twice or three times a day. A green or yellow vegetable at least every other day. An egg every other day. Half of the total of bread and cereal in whole-grain ("dark") or enriched form.

How much money should you spend for the different kinds of food? Buy milk first. If there are five in the family—your mother, father, big brother, little sister, and yourself—you should buy about three quarts of milk a day. How much will three quarts of milk cost in your neighborhood? Buy plenty of milk before you spend your money for meat.

Buy fruit and green vegetables next. Try to buy one green, leafy vegetable and some kind of fresh fruit every day. If you have plenty of money, you can buy oranges, other fresh fruit, lettuce, celery, and other green leaf and yellow fresh vegetables every day.

If you have little money to spend, you can buy canned tomatoes, instead of oranges or other fresh fruit, and the cheapest green, leafy vegetable that is for sale. You will buy potatoes enough for every day. Every week you will buy some of the dried fruits and vegetables—prunes, peaches, apricots, raisins, split peas, and beans. A careful study of food needs showed that adults should have about two pounds of fruit and vegetables a day. People in the

country and in small towns are fortunate because they can raise their own vegetables and fruit.

Enough butter or fortified margarine and other fats should be bought to supply every member of the family, except the baby, with about one half pound of fat a week.

Bread and cereals are the cheapest foods. Cereals in boxes cost more than cereals bought by the pound. Bread that is a day old costs less than fresh bread and is really more healthful. If you have very little money to spend for food, you will have to spend most of it on cereals and bread and milk. Why is it important to buy the brown cereals and brown or enriched bread part of the time?

The same scientist says that each dollar spent for food should be divided in the following way: one fifth or more for milk and cheese; one fifth, more or less, for fruit and vegetables; one fifth or more for cereals and breads; one fifth or less for meats, fish, and eggs; one fifth or less for fats, sugars, and flavorings.

The careful buyer knows that a single food is not adequate for good nutrition. Cereal, bread, and potatoes do not supply all the elements the body needs. But these foods can be combined with milk, eggs, leafy vegetables, and meat so that the elements lacking will be supplied.

Hundreds of recent discoveries have shown the importance of a wise choice of food. With proper food better health may be won. Life is lengthened. Certain diseases are prevented. The best kind of food and the right amount of food make possible a high degree of well-being. That is why what you buy at the store is so important. These units on food are not just "something to read." They are "something to put into practice."

A junior high school class that studied about calories,

minerals, and vitamins made real changes in their food habits. The class persuaded the stores of the neighborhood to sell more bottles of milk; cocoa made with milk instead of with water; and egg, lettuce, and cheese sandwiches. The first day the storekeeper offered peanut butter, egg, and lettuce sandwiches he sold forty-one; the next day he sold sixty sandwiches. In front of the school building were pushcarts selling cheap, *insanitary* * drinks and "hot dogs." The pupils passed them by. They bought better lunches.

For example, one boy's lunch showed this rapid change: The first day he ate a frankfurter and roll and a piece of rich pastry. What food values did he buy? The second day he had ice cream and a piece of pie. What food values did he get this time? The third day he chose an egg sandwich and a glass of milk. Now he is bringing egg sandwiches and fruit from home and buying milk. What food values does he now get?

Three girls learned to choose excellent meals in their school *cafeteria*.* In this cafeteria the prices were kept low so that everyone could have a good lunch. Mary had fifteen cents, Alice had thirty-five cents, and Helen had fifty cents to spend for lunch. Each chose wisely from the following list:

Vegetable soup	$0.10
Cream of asparagus soup	.10
Carrots and peas	.10
Mashed potatoes	.05
Hamburg steak and potatoes	.25
Buttered cabbage	.10
Pineapple-and-cream-cheese salad	.15

Spinach-and-egg salad	$0.15
Milk	.05
Roll	.02
Bread	.02
Butter	.02
Cocoa with whipped cream	.10
Vanilla ice cream	.10
Baked apple	.10
Chocolate layer cake	.10
Fruit cup	.10
Prune pie	.10
Cookies	.03

Mary spent her fifteen cents on a bowl of cream of asparagus soup with crackers and a dish of mashed potatoes. The milk and butter in the cream of asparagus soup contained vitamins A and B_2, calcium, phosphorus, and protein. The asparagus added iron and more vitamins. For dessert she ate an apple and some cookies she had brought from home. The raw apple supplied a little vitamin C, some of the B vitamins, and minerals.

Alice, who had thirty-five cents to spend, also bought the cream of asparagus soup. The spinach-and-egg salad looked so good, with its light-green, crisp lettuce and dark-green, chopped spinach decorated with the gold and white circles of hard-boiled eggs, that Alice chose it. The lettuce furnished vitamin C, and the spinach supplied vitamins A and B_2 in large amounts. Asparagus, spinach, and egg yolk are all rich in iron and other minerals. Alice spent her remaining ten cents on vanilla ice cream, a good source of vitamin A as well as vitamin B_2.

Helen usually had her supper at night and her dinner

in the middle of the day. That was why her mother gave her fifty cents to spend at noontime. Helen chose vegetable soup; and a very good vegetable soup it was, thick with carrots, peas, potatoes, celery, and onions. It supplied minerals and vitamins. She had forty more cents to spend. As this was her dinner, she chose meat and potatoes. The meat furnished iron and protein; the potatoes, vitamin B_2 and minerals. For dessert she chose a baked apple with cream and molasses cookies with raisins in them. The baked apple and cream furnished vitamin A, vitamin B_1, iron, and calcium. The molasses in the cookies furnished more minerals. The raisins added some more iron to the meal.

Some boys and girls brought cheese or egg or lettuce sandwiches and fruit from home. Everyone in that school tried every noon to choose an *A* lunch. An *A* lunch is one that contains at least three of the "Basic Seven" —fruit or vegetables, milk, and cereal or bread.

If you want to have good meals at low cost, ask your teacher to get some bulletins that tell how to have healthful food when you have little money to spend.

AT THE MARKET

There are many things to think of when you are buying food. The storekeeper gets food in large quantities from the farm or the factory. He puts some of it in packages and sells you the amount you need. He should try to have his food *clean,* to avoid germs; *fresh,* so that it will taste good and have the most food value; *pure,* that is, free from harmful substances; and as *cheap* as is possible. More and more, manufacturers are putting their products in germ-proof packages. They seal food in

cellophane, which keeps it clean and fresh. You go to the store to get food that is clean, fresh, pure, and suited to your pocketbook and taste.

Is the food clean? First of all, you should choose a clean store. Did you ever think of a store having to pass a test? You can test stores by asking such questions as these:

1. Is the food in the store kept covered? Are the crackers kept in tightly closed boxes? Is the cheese put back under cover as soon as a piece is cut from it? No flies or dust should be allowed to reach the food.

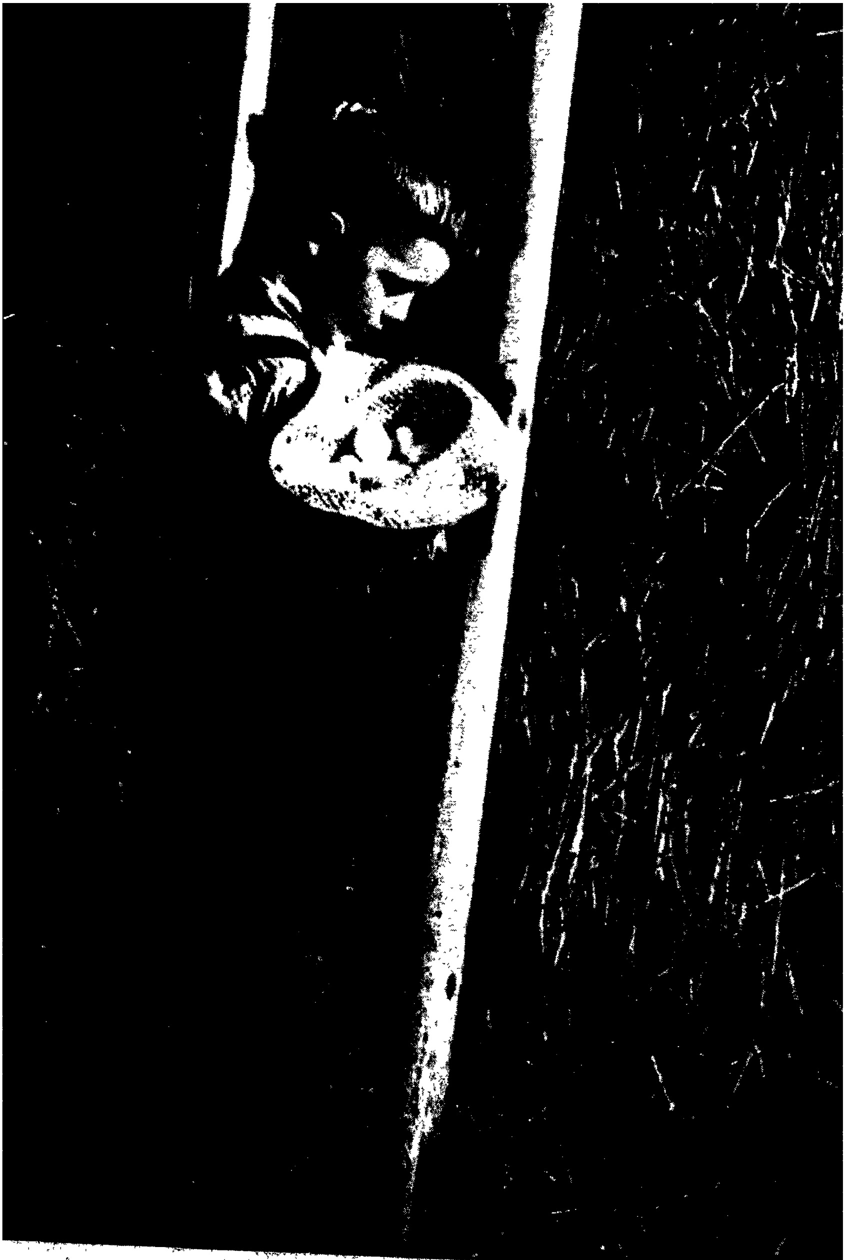
2. Is the storekeeper clean? Does he have clean hands and a clean apron?

3. Does he weigh and measure food, such as butter, cheese, and other ready-to-eat foods, without touching it with his hands?

4. Does he measure the foods into clean bags, wrapping paper, or boxes and not into the metal dish that is a part of the scales?

Give a reason for each test.

Is the food fresh? Is milk kept cold? It should not be allowed to stand outside or in the warm store. You will soon learn which stores have the freshest food. You will not go back to a store in which the lettuce that looked fresh on the outside was rotted at the heart. You will not buy from a storekeeper who gives you fruit that is beginning to decay. You will buy eggs at another store if the yolks of the ones you bought last broke easily and mixed with the whites. The yolk of a fresh egg is plump and does not break easily. Another test of fresh eggs is to drop them into a bowl of water. Fresh eggs sink to the bottom. Stale (old) eggs stand end up in the water as if they were going to float. Some of the water has evaporated from



HOW WOULD YOU TELL WHETHER THESE EGGS ARE FRESH?

eggs that have been kept a long time. There is a large air space in one end of them. This makes them lighter than fresh eggs.

If you have more eggs in the spring and summer than you can use, you can store them for winter. Eggs may be kept by putting them in *water glass.** Water glass is a liquid you can buy in the drugstore. It coats the egg shells. Eggs must be clean and fresh when they are put in water glass. Then they keep fresh for months.

Is the food pure? Pure food is of course clean. It is important that the place where food is canned or put into packages should be very clean. People who work in food factories often wear white uniforms. Each person who handles food should have clean hands and nails. Each person should be careful to keep dirt and harmful bacteria from getting into the food.

Pure food is also fresh food. Spoiled food is unsafe to use. You can see for yourself when fruit or vegetables on the counter look brown and wilted.

But you cannot tell, just by looking at most foods, whether they contain any harmful substances. That is why there is a national pure food law to protect us from food that may be unsafe to use. Many states and cities have laws or rules about pure food, especially for milk and meat. Some of these laws forbid a food manufacturer, or packer, as he may be called, to add harmful chemicals to keep food from spoiling or from showing that it is spoiled. Other laws forbid a packer to add coloring to food to make it look better than it is. Coloring substances that are not harmful usually may be added if the label tells that they are used. Still other laws prevent a dishonest packer from mixing in cheaper materials that do

not give the food values the buyer thinks he is getting. There are many such rules, but sometimes they do not protect us so much as we think they do. The thrifty buyer must learn to read the food labels to protect himself.

Does the food suit your pocketbook? You can choose food that is both cheap and good. For example, you can buy kale instead of lettuce. Kale is cheaper than lettuce, and it is richer in vitamins and minerals.

THE THRIFTY BUYER

The thrifty buyer spends some time, effort, and thought to get good values and to save money. The thrifty buyer plans ahead. When you plan ahead, you can make your money go farther. You are also likely to be better satisfied with what you choose. This is true whether you are buying food or clothes or other things.

Your mother knows how important it is to be able to plan. Before you go to the grocery store, she looks in the refrigerator to see what can be used for the next meals. She may check over the things in the supply cupboard or pantry. Then she makes a list.

Many mothers plan meals for two or three days or for a week at a time. Such planning makes it easier to have well-balanced meals and to use up any leftovers. It also saves stopping to think about each meal. It saves trips to the store. Very clean and cold refrigerators will keep food in good condition for several days.

The person who waits until mealtime to plan a meal is likely to choose something that can be prepared in a hurry. Last-minute meals are apt to be poorly balanced. There may not be time to prepare and cook yellow and green vegetables. Food may be fried just because frying

is a quick method of cooking. One way to save money is to buy less expensive cuts of meat and to cook them longer. Then they become tender and have a good flavor. Chops and steaks that cook in less time cost more. When a large part of the food money is spent for meat, there is less money for other basic foods. In some families where the meals are not carefully planned the children are given Bologna and spiced meats frequently. These are the least desirable kinds of meat.

When you go to the store, you notice that the prices of some things are about the same each time. The prices of fruits and vegetables or of meats may be different from day to day or week to week. These foods are cheaper when they are in season. When foods are in season large

supplies can be brought in from the farms and orchards. Then the prices are usually lower. The thrifty buyer who knows which food elements the different vegetables supply can often save money by choosing vegetables that are in season, or low in price. The buyer who does not know much about food values could not spend his money so wisely. All he could do would be to *guess* which food gave the most value for the money. You *know*.

Years ago fresh fruits and vegetables could not be bought during the winter, no matter how much a person wished to spend. Now we have fresh foods the year around, so that we can eat more healthfully. Fresh fruits and vegetables can be bought at reasonable prices during most of the year. Food can now be shipped quickly from different parts of the country. Long trains of freight cars from the south and west bring food to markets in the cities. Foods that might spoil are carried in refrigerator cars. Sometimes the extra cost of raising and shipping out-of-season foods makes them more expensive, but the careful shopper can have some fresh fruits and vegetables all year without having to spend a great deal of money.

A new way of treating foods so that they can be bought at all seasons is the quick-freeze method By this method fruits, vegetables, meat, and fish are frozen quickly when they are ready to market. Then they are kept frozen until you buy them and take them home. You can keep them frozen at home if your refrigerator is cold enough. Be sure to follow the directions for cooking them. They should be used as soon as they have thawed, for otherwise they spoil.

The only way to have a variety of food during the winter used to be to can food at home. If you have a

farm or garden, you may still save money by canning or freezing your own fruits and vegetables. By the old-fashioned methods of canning many vitamins are lost. By newer methods little of the vitamins is lost. One cup of fresh orange juice had 122 milligrams of vitamin C. The same amount of canned orange juice had 103 milligrams. Some canned grapefruit juice had more vitamin C than the fresh grapefruit juice tested.

Another way to supply a variety of food is to have on hand apples, potatoes, dried foods, or other kinds that keep well. You can buy these when the prices are low and use them during the time when the prices of some fresh foods are high.

As has been suggested before, it is wise to plan to have some fresh fruits and vegetables as often as possible. Vegetables and fruit fresh from a sunny garden have most vitamins. You can see for yourself the amounts of vitamins lost when vegetables are stored or frozen:

	PER CENT OF VITAMIN LOSS			
	Vitamin C	Vitamin B_1	Vitamin B_2	Vitamin A
Asparagus				
Fresh from the garden	0%	0%	0%	0%
Stored twenty-four hours at room temperature	40%	3%	22%	9%
Stored one week around freezing temperature	57%	18%	27%	14%
Frozen	24%	28%	42%	24%
Spinach				
Fresh from the garden	0%	0%	0%	0%
Stored twenty-four hours at room temperature	29%	2%	5%	8%
Stored one week around freezing temperature	35%	15%	17%	5%
Frozen	63%	51%	40%	13%

What general conclusions can you draw from the figures on page 179?

Some people say that they cannot afford fresh fruit during the winter. If they stopped to think how much they pay for pies and cakes and other similar desserts, they might be surprised. Suppose that there are four people in a family and that each person in the family has a piece of pie that costs ten cents. How much fruit and of what kind could be bought for that forty cents? When the baking is done at home, it may seem cheaper because few people count up what home-baked foods actually cost. Most of the ingredients are on hand on the day when the baking is done. You can figure out the cost of homemade pies and puddings and then compare this cost with the prices of fresh, canned, and dried fruits.

The thrifty shopper not only plans what to buy and knows how to choose good sources of food values at low prices, but he also sees that he gets the right amounts for his money. In some stores everything is plainly marked. In others you have to ask the prices. It is wise to ask before you order. Do you ever say, "Give me a dime's worth of that," or do you ask for a pound or a dozen? The people who make a study of wise buying advise you to ask always for a definite amount. See for yourself what the scales read. In many stores the clerk adds up the prices of the things you have bought and gives you the adding machine tape with the total printed on it.

Many of the things you buy are in packages. On each package the net weight should be printed. The net weight is the weight of the contents inside the package. Look for the net weight, so that you can tell how much food a package really holds. It may not be so full as you

expect it to be. Boxes and bottles of special shapes sometimes look as if they hold much more than they actually do.

Many buyers are careless about noticing weights. Many more do not take the trouble to compare the prices per pound or ounce in different packages. There are, let us suppose, two packages of the same kind of food priced at 19 cents. One package is marked net weight 26 ounces. The other is marked net weight 1 pound, 6 ounces. Which would you buy if both boxes looked about the same size and if the contents were equally good? Explain your answer. The grocery store is a good place to use your arithmetic.

There is more to buying canned food than asking for a ten-cent can or a big can or the one with the brightest picture on the label. Here again the thrifty shopper compares the actual prices per ounce of different brands and sizes. Some cans contain more liquid than solid food. Fruits or vegetables of special sizes or tenderness, as you would expect, may be more expensive. Whole fruits and vegetables are often higher in price than the broken pieces. Yet the broken pieces have as much food value as expensive special-quality fruits and vegetables.

You can easily see that a high price is not always a sign that you get the best food for health. *Consumers,** persons who buy, like to know just what they are buying. They like to be able to know exactly what the names on the labels mean and to have those names always mean the same grades of food. The government has done a great deal to help the consumer know what he is buying.

If you have plenty of space in which to store food, it is often cheaper to buy large boxes or packages. It

costs the man who prepares the food or who raises it less to wrap and ship a few large boxes than many small ones. It also costs the people who handle the boxes less to sell them than to make a number of small sales. You can save money by buying in quantity, as it is called. A fifty-cent box may contain almost three times as much as a twenty-five cent box. The cellophane wrappers that protect food from germs keep it fresher and make it safe to buy larger packages of breakfast foods, for example, than you otherwise could.

If you buy at sales, you may be able to save money. But, although fruits or vegetables that spoil quickly might cost less in big amounts, unless you have a large refrigerator—and a large family—you would be wasting money to buy so much that they would spoil.

Good meals do not "just happen." They take time, effort, and planning. But good meals, as everyone knows, are an important part of health and of the enjoyment of living.

Things to Do

1. From the menu on pages 170-171 choose three good lunches. For one lunch you have 20 cents; for another, 30 cents; and for the third, 40 cents. Write beside each food you have listed for the lunches its special food values. Check each lunch to see that you have at least one good source of vitamin A, vitamins B_1 and B_2, vitamin C, vitamin D, calcium, phosphorus, iron, protein, carbohydrate, and fat.

If you have no cafeteria in your school, plan a good lunch to bring from home or find out the best places in the neighborhood to get milk and vegetables served in a clean, sanitary way.

2. Plan a party for your own friends or for your younger brothers and sisters. Serve the refreshments at a regular mealtime. Have a menu like one of these:

(1) Sandwiches
Fruit
Gelatin with whipped cream

(2) Sandwiches
Hot chocolate
Fruit cup—apples, bananas, and oranges, with whipped cream on top

(3) Oyster soup
Fruit salad and crackers
Ice-cream cones

(4) Cream chicken
Mashed potatoes
Pear salad
Ice cream

For a party for young children some mothers serve a cereal with a special party look. Plan how you could do this for very young children.

You may be able to plan an outdoor party and cook your lunch or supper out of doors, in the back yard, in the woods, or on the beach. Then you can have a meal like this:

Lettuce and tomato sandwiches
Bacon or steak broiled over the fire
Apples, oranges, and bananas
Marshmallows to roast

3. Make a sweet fruit salad for dessert the first chance you have. Find recipes for fruit salads in cookbooks, magazines, or newspapers.

4. Make a list of the foods richest in vitamin A. Do these foods also yield a large number of calories? For example, green-leaf vegetables are rich in vitamin A. Are they high or low in calories? A quart of milk supplies about as much power to work and play as 1 pound of round steak. What is the cost of each?

1. Bill's father said (page 163), "Perhaps there are ways in which we can all save." What are some of these ways? Which are the most practical for you and your family? How would knowing how to buy food wisely give you more spending money?

2. Bill said all his friends gathered at the corner drugstore after school. Of course, he wanted to go with them. But he did not have any money to spend. Can you think of any solution to this problem?

3. Some families spend much more on tobacco and alcoholic drinks than Bill needed for his weekly allowance. These families would be healthier if they spent their money wisely. Do you know of any family that has solved this problem? Can you think of any solution to it?

4. Even with wise buying of food and clothing, your allowance may still seem too small to you. Why? Is it because:

a. your friends have more spending money than you?

b. you think it isn't fair that your brother or sister is getting a larger allowance than you?

c. you buy the things you want when you want them without thinking of other things you will need in the future?

d. you have got into the habit of borrowing on your next week's allowance?

What is the sensible thing to do about it?

a. Don't try to "keep up with the Joneses"—with your wealthier friends. Some people have more money than others, just as they are different in other ways. Accept this fact.

b. Be fair and ask, "Does my older brother or sister really need more money than I do?"

c. When you see something you want, stop and think, "Do I need it now? Is there something else I'd rather have and save my money for?"

d. Make a plan for spending your week's allowance. Include:

Your necessary expenses such as lunch and carfare
Money for a baseball game or other fun
The amount you want to save for something special.
Extras that you did not count on.

5. Prices change! Compare the menu in a good restaurant in your community with this menu which was used in 1834 at a famous restaurant in New York City:

BILL OF FARE	CENTS
Cup tea or coffee	1
Soup	2
Fried or stewed liver	3
Hash	3
Pie	4
Beef or mutton stew	4
Pudding	4
Fried eggs	5
Ham and eggs	10
Hamburger steak	10
Roast chicken	10

Regular dinner, 12 cents[1]

Discussion Questions

Are these statements true? Why or why not? If they are not correct, change them so as to make them correct.

1. It is better to ask your parents for money when you need it than to have an allowance of your own.

[1] Oliver E. Byrd, *Health Instruction Yearbook* 1952, pp. 31-32. Stanford, California: Stanford University Press, 1952.

2. No one can plan a healthful diet unless he has a good deal of money to spend.

3. Fish is a good brain food.

4. Some soft drinks contain drugs that may become harmful to people. Soft drinks are also bad for the teeth.

5. Drinking soft drinks often crowds out needed foods.

6. The more vitamins you eat, the better.

7. You should buy at a store (a) where butter and milk are kept cold, (b) where the foods are kept covered, (c) where there are no flies.

8. Tea and coffee have no food value.

9. Candy contains more vitamins and minerals than fresh fruit.

10. Many children would not be sick and undernourished if their parents spent their money for good food instead of for cigarettes and alcoholic drinks.

11. Making a budget showing how you are going to spend your money helps you to spend it wisely.

Interesting Books

AHRENS, BUSH, EASLEY—*Living Chemistry*, pp. 468-481

BAXTER, JUSTIN, RUST—*Sharing Family Living*, pp. 24-43

GRAHAM and LIPSCOMB—*Dr. George Washington Carver, Scientist*

HILLIS—*Patches and Plans*

KEENE—*Let's Figure for Improved Living*

KNOX, STONE, MEISTER, WHEATLEY—*The Wonder World of Science*, Book Six, pp. 258-263

MCDERMOTT, TRILLING, NICHOLAS—*Food for Better Living*, pp. 459-480

PATRICK—*When Winter Comes*

SHULTZ—*The Young Consumer*

THOMAS—*Fruit, Nuts, and Berries*

TRILLING and NICHOLAS—*You and Your Money*

UNIT VII

PROTECTING YOURSELF AND OTHERS

Science is saving lives. In 1910 there were 23,000 cases of typhoid fever. In 1944 there were 600. In 1950 the nation's death rate was the lowest it had ever been. Science is making living healthier and happier.

But unnecessary illness is still causing much unhappiness. It is costing lots of money, too. The cost of illness in the United States is about 15.7 billion dollars every year. This is about one sixth of all the money earned.

Yes, illness is a problem. What are the special health problems in your community? You can help solve them. Knowing how some diseases have been conquered is encouraging.

The top X-ray picture shows a healthy chest. The light, irregular shadows in the lower picture show that tuberculosis bacilli have been active.

THE WAR AGAINST INFECTION

"My dear, your handkerchief!" "Hey, don't breathe on me; you've got a cold!" "You go to bed; you look feverish." Isn't it too bad we do not hear remarks like this oftener? Instead we hear: "Oh, I'm not afraid of your cold. I've just had one." "Don't dirty another glass. I'll use yours." So we have diseases. They spread. We get sick, miss school, miss parties, lose work, feel blue. It is a little silly, isn't it, to let sickness spoil our fun when it's possible to check diseases if we all really try?

We all have a war to fight. It is a war we can win. This is the war against disease. Its weapons are sunlight, fresh air, wholesome food, and scientific methods of disease prevention. The persons who fight in this war are thinking of the welfare of others. A few years ago we spent most of our time and money helping the person who was ill. Today we spend more time and money keeping people from getting sick. Keeping people well and preventing disease are important parts of the *conservation* * program.

TUBERCULOSIS

We are winning the fight against tuberculosis. The number of deaths from tuberculosis has greatly decreased since 1900. But tuberculosis is still a serious health problem. It is still the first cause of death from communicable diseases among persons 15 to 24 years of age. Around 400,000 cases of active tuberculosis is far too many. We know enough to be able to cut down this number of deaths.

What causes tuberculosis? The cause of tuberculosis has long been known. A small germ, the *tubercle* * bacillus, causes tuberculosis. You can see it only with a microscope. Tubercle bacilli are like people in many ways. They "breathe" oxygen They give off carbon dioxide. They require warmth. They need food. These tiny bacteria thrive on the same things that people do. That is why they grow so rapidly in the human body.

The bacteria that cause tuberculosis are killed by boiling water and direct sunlight. They are also killed by certain chemical substances, such as iodine. But whatever kills the bacteria usually injures the tissues of the body. That is why it is so hard to get rid of tubercle bacilli once they have found a lodging place in a person's body.

Poor food, fatigue, and exposure to wind, cold, and wet do not *cause* tuberculosis. But these conditions help bacteria to get a good foothold in a person's body. In other words, poor health and poor *hygiene* * increase *susceptibility* * to tuberculosis. Some people seem to be born more susceptible than others. When the tubercle bacilli gain entrance to the body, such people are more likely to get the disease than are people who are less susceptible.

How may tuberculosis be prevented? The prevention of tuberculosis begins at home. It is a family disease. Sometimes whole families have it. Why does tuberculosis run in families? It is not because the disease itself is inherited from the parent by the child. Babies are not born with tuberculosis. Children may be born, however, who are especially susceptible to it. Children often get it as they grow up in families in which a father, mother, aunt, grandfather, or grandmother has tuberculosis.

Frequently older people have tuberculosis and do not know what is causing them to feel sick and tired. In some cases they do not feel sick at all. What they think is *asthma,** *indigestion,** "throat trouble," or something similar may really be tuberculosis. If these people cough and sneeze and spit carelessly, the tuberculosis germs are spread to others. Then babies and young children are in danger of getting the disease.

Every tuberculosis case comes from another. The tubercle bacilli are found in large numbers in the material from the nose and throat of people who have tuberculosis. A person need not be very sick with tuberculosis in order to spread the bacteria. Even a person who has so little tuberculosis that it takes the X ray or *fluoroscope* * to show it may carry the bacilli in his nose and throat. A person gets tuberculosis only when tubercle bacilli have got inside him. Therefore one way to win the fight against tuberculosis is to prevent the bacteria carried by one person from reaching other people.

Since the chief way in which the tubercle bacilli are passed from one person to another is in the discharges from nose and throat, what should be done? Prevention is simple.

A person who has tuberculosis should do the following:

1. Kill all the bacteria as soon as they come from his nose and throat. How can he do this? By spitting into little paper cups or paper handkerchiefs. By blowing his nose in paper handkerchiefs. By burning these paper cups and paper handkerchiefs promptly. No bacteria can live in flames. Instead of doing these easy, simple things, what do careless people sometimes do? They spit on the sidewalk or even on floors where people walk and little

CATCH A SNEEZE SO THAT SOMEONE ELSE WILL NOT GET YOUR GERMS. A PAPER HANDKERCHIEF IS BETTER.

children play. Tubercle bacilli will live in *sputum* * (material coughed up from the lungs) for more than an hour even when they are exposed to bright sunlight. This sputum, not yet dried, may stick to the shoes of a father going home from work. Some of it may brush off on the carpet. His little baby is just learning to creep. When creeping around the floor, the baby may get some of the bacteria on his hands. At that age the baby puts his fingers and other objects in his mouth. In this way he may become *infected* * with the tubercle bacilli.

2. A person who has tuberculosis should not allow the bacteria to pass directly to other people when he is talking to them. He should not kiss them. He should always cover his nose and mouth when he sneezes or coughs. If one member of a family has tuberculosis, it is often easier to prevent the spread of the tubercle bacilli

in his family if he goes away to be cured. If he stays at home, he should sleep in a room by himself, use his own towels, and have his sheets, towels, underwear, silver, and dishes boiled and kept separate from those used by the rest of the family.

3. A person who has tuberculosis should keep his hands and other objects away from his face. Perhaps this morning you have sat chewing your pencil while you were wondering how to do an arithmetic problem. Explain how that habit may lead to tuberculosis or other communicable diseases.

4. A person who has tuberculosis should wash his hands and face before eating food. He should not prepare food for others. Food should always be prepared by cleanly, healthy people both in the home and in all public eating places.

It is not only people who spread bacteria. Flies also are guilty. Food should be protected from flies. In some communities flies are seldom seen. People have successfully waged war against them. They have taken away piles of manure in which flies breed, that is, lay their eggs and hatch their young. In this way they have prevented millions of flies from being hatched. It takes about ten days for a fly to grow up. If the manure cannot be carted away promptly, it can be treated with chemicals that destroy the flies' eggs or the flies in the early stages of their lives. *DDT* * or some other insect killer, sprayed in stables, gets rid of flies. But, remember, any poison that will kill insects may harm people. It is not safe to spray DDT on cows and other animals or on the walls inside your house. Instead, keep flies from being born.

These are the chief ways of preventing the spread of


WAYS OF PREVENTING

tubercle bacilli. All are simple ways. And yet these simple ways may make the difference between sickness and health, sometimes between life and death. Some of them are a part of good manners.

Tubercle bacilli are also sometimes found in the milk of cows that have tuberculosis. Our public health services see that milk from diseased cows is not used. Every year a great many cows are tested to find if they are free from tuberculosis. A final protection to milk is *pasteurization.**

Is checking the spread of tubercle bacilli all you can do in this crusade against tuberculosis? No, because in preventing tuberculosis good health has a part to play. Even though bacteria get into the nose, throat, and lungs, a healthy body is usually able to resist them. Boys and girls help protect themselves from tuberculosis by following these rules:

1. If you live in a temperate climate, be out of doors in the sunlight two or three hours every day, wearing no more clothing than you need to keep warm.

2. Eat healthful meals, such as you have learned to plan, at regular times in a cheerful, unhurried way.

3. Rest whenever you begin to feel overtired.

4. Sleep ten or eleven hours at night. If there are any signs of tuberculosis, take an hour's rest morning and afternoon. Rest is one of the secrets of preventing as well as curing tuberculosis.

5. Drink four glasses of water a day.

6. Always practice the simple but essential habits of washing your hands before eating and keeping your hands away from your face.

7. Have a health examination at least once a year and

SUNLIGHT AND FRESH AIR HELP BOYS AND GIRLS BUILD RESISTANCE AGAINST DISEASE.

a chest X ray every few years. These protect others as well as you. As more and more people have regular physical examinations doctors will be able to discover those carriers of tuberculosis who have the disease without knowing it.

Can tuberculosis be cured? Tuberculosis can be cured if it is discovered early enough. Now it is possible to find tuberculosis without going to great expense and to find it early. Two thirds of the cases now discovered are in an early stage, in which, with good care, cure is almost certain. Some years ago only 10 per cent of the cases were discovered in their early stages. Often a person did not know he had tuberculosis until he was in the last stages of it. By that time he usually has a cough, is tired all the time, and may spit blood. Then a cure is almost impossible. The point is to discover the disease early.

Tuberculosis can best be discovered in two ways: (1) It may be discovered by a special test, called the *tubercu-*

HOW MANY THINGS CAN YOU FIND IN THIS PICTURE THAT WILL HELP THESE GIRLS TO RECOVER FROM TUBERCULOSIS?

lin * test, which shows whether there are tubercle bacilli in the body. Have you taken the test? In one school less than 15 per cent of the students bothered to be tested when the tuberculin test was offered free of charge. Then a group of students got busy. They made posters, they talked to classes, they showed movies on tuberculosis in assembly. They showed how simple it is to take a tuberculin test. They got results; 89 per cent of the students took the tuberculin test. (2) Tuberculosis may be discovered by an X-ray examination of the chest after the tuberculin test if this test shows that tubercle bacilli have been in the body. Some schools are already giving their students these two advantages. Many workers get their chests X-rayed. If the X ray shows some shadows on the lungs (see pictures on page 188), tubercle bacilli may

have been there. And the body has been building walls of calcium around the bacilli, walling them off completely and making it impossible for them to do harm.

If active tuberculosis is discovered, treatment should be begun immediately. The patient is given rest and more rest flat on his back in bed. Rest gives a person's lungs a chance to heal. It gives his body a chance to carry on the battle. The bacilli destroy the lung tissue; and, since we have to breathe all the time, the lung needs a chance to heal. When we're lying down, our lungs do not have to work nearly so hard as when we are up and about and larger supplies of blood have to be purified in the lungs. So they are better able to get well. It is like having a cut on your finger near a joint where it gets pulled open every time you bend the finger. If you keep your finger straight and let it rest for a few days, the cut heals in a hurry. Rest does just that for the lungs, too. At the same time the patient enjoys fresh air and wholesome food. Sometimes the doctor makes the diseased lung collapse partly to help it heal more quickly.

Many people recover from tuberculosis, but it is better to prevent it than to have to cure it. "An ounce of prevention is worth a pound of cure."

Some of the habits that help prevent tuberculosis also help prevent colds, sore throat, diphtheria, measles, whooping cough, scarlet fever, and other communicable diseases. Most children do catch measles, chicken pox, and whooping cough sometime during early school years. If they have a light case of the disease, no harm is done and they get *immunity* * from the disease for life. If they have a severe case or poor care, much harm may be done. These diseases may affect the heart, the sight, or

SUN VISORS PROTECT THE EYES OF CHILDREN
WHO ARE RESTING OUT OF DOORS

the hearing. They make it easier to catch still more serious diseases. There is now a vaccine, which all babies should be given, to make whooping cough, if they catch it, a light disease instead of a very serious one. If there are babies or young children in your families, tell your parents about the vaccine. The same good habits that help to prevent tuberculosis help to prevent serious harm from childhood diseases.

MEN WHO HAVE HELPED IN THE FIGHT AGAINST TUBERCULOSIS

Many people have worked toward the prevention and control of tuberculosis. Among them you often hear of three: Laënnec, Koch, and Trudeau. All three were doctors. Laënnec and Trudeau themselves had tuberculosis.

By reading the stories of their work, you will also learn about scientific method.

René Laënnec, as you may guess from his name, was French. Over a hundred years ago he was the chief physician of a hospital in Paris. He was particularly interested in diseases of the chest. From the personal physician to the Emperor Napoleon, Laënnec had learned how to find out whether a person's lungs were diseased by tapping his fingers against the chests of sick people and listening to the sounds that were made. When the lungs are diseased, the chest sounds are different from those of well people. Your doctor taps your chest when he gives you a health examination. He also places a small funnel against your chest and back and listens through the rubber tubes that lead from the funnel. Little children call this instrument the doctor's telephone. The doctor calls it his *stethoscope*.* Through it he can hear chest sounds much more clearly than without it. It was Laënnec who invented the stethoscope. This is how it happened.

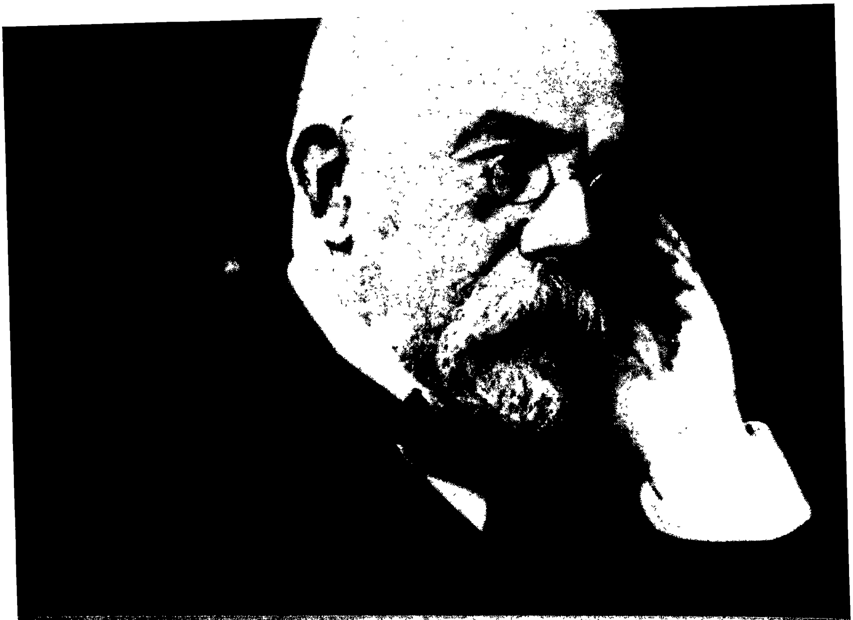
You think of a hospital as one of the cleanest places possible. But before Pasteur had shown the relationship between bacteria and disease, hospitals were far from clean. Sick people were not washed. There were no fresh, white beds. The sick people often lay on the floor or in dirty straw. Sometimes people with different communicable diseases were crowded three or four in a bed. It is easy to understand how tuberculosis and other diseases spread through such hospitals.

Laënnec is said to have found it unpleasant to lay his ear against the dirty bodies to listen to chest sounds. If the patient was overweight, the fatty layers over the chest made it difficult for him to hear any sounds.

One day, so the story goes, Laënnec was walking through a park on the way to the hospital. Perhaps he was thinking of a sick woman whose chest sounds he could not hear. Children were playing in the park. Something about one group caught his attention. He stopped to watch what they were doing. One child was holding his ear to the end of a long piece of wood, just as Laënnec held his own ear to sick people's chests. Another child tapped the farther end of the wood. Those of you who have played Indian with one ear to the ground to listen for approaching footsteps know what was happening. The sound of the taps was traveling along the wood. At once Laënnec saw how to solve his problem. He hurried to the sick woman's bed, rolled up a paper-covered book, and placed the tube against her chest. The idea that had come to him as he watched the children was a good one. He could hear the chest sounds plainly.

Laënnec experimented with little wooden funnels until he made something much like a modern stethoscope. He used it to learn a great deal about tuberculosis. Half the patients in his hospital, he found, had tuberculosis. As a result of his studies he wrote a book about tuberculosis and his new way of listening to sick people's chest sounds. Much as he learned, he did not know enough to cure himself. Not long after he wrote his famous book he died of tuberculosis.

Laënnec's stethoscope helped doctors tell when a person had tuberculosis, but about fifty years passed before anyone knew what causes the disease. A German housewife gave her husband a birthday present. The present was a miscroscope. The husband was a country doctor with a hobby. His name was Robert Koch.


ROBERT KOCH

Pasteur had found that germs cause certain diseases. Koch, who was interested in Pasteur's discoveries, began to study bacteria himself. Soon Koch's office was almost like a laboratory. He raised bacteria and studied them through his new microscope. Like Pasteur, Koch first experimented with diseases of animals. The particular disease he studied was a fever called anthrax, which kills cattle and sheep. Sometimes it kills people. Koch proved that a certain kind of bacterium causes anthrax.

Later he found that another kind of bacterium was always present in *cultures* * made from the little lumps in tuberculous tissue. (These lumps, which are called tubercles, gave tuberculosis its name.) When Koch injected bacteria from the cultures into healthy animals, they developed tuberculosis and died. Now the cause of

the disease was known and ways of preventing its spread could be found. In later years Koch discovered the bacteria that cause certain other diseases.

Koch also thought out a way of making it easier to study bacteria. Up to this time scientists had put bits of tissue, blood, or secretions from sick people or animals into meat broth. The broth supplied food for the bacteria and gave them a place to grow. Then the scientists had to "fish" for the bacteria, which were so small that they could be seen only under a microscope. This was a difficult and clumsy method. Koch put gelatin into the broth. The bacteria grew on the firm surface of the gelatin. It was easy to study them or to move them to other cultures. Modern laboratories use gelatin cultures.

Koch made a set of simple rules to use in deciding whether or not a certain germ might be the cause of any certain disease. Scientists followed his rules and within a few years discovered the causes of *cholera,** typhoid fever, *dysentery,** and many other diseases.

Koch had long since outgrown his office-laboratory. He became director of the Institute of Infectious Diseases at Berlin. Twice he was given the Nobel prize. The man who began his studies as a hobby has been called the father of *bacteriology,** but most people think of him as the man who found the cause of tuberculosis. He showed that the bacilli are spread by sputum and suggested ways of preventing the disease.

In spite of his many successes Koch had one severe disappointment. He tried to make a substance from the tubercle bacilli to inject as a cure for the disease. This was a failure although from the tuberculin, as he called it, the tuberculin test was developed. Scientists are still

trying to find some vaccine or *antitoxin* * to use against tuberculosis.

During Koch's lifetime Wilhelm Roentgen had discovered the X rays doctors now use to take pictures of chests of people who may have tuberculosis. The X rays show whether or not damage had been done by tubercle bacilli in the lungs and how much damage, if any, has been done. X-ray pictures are also used to help the doctor set broken bones and to show growths or other conditions that cause pain and sickness.

Our story now shifts to the United States. A young doctor, Edward L. Trudeau, was told that he had tuberculosis. No doubt his friends said: "How sad! Just ready to begin his career. He has a family depending on him, too. But of course there is no hope."

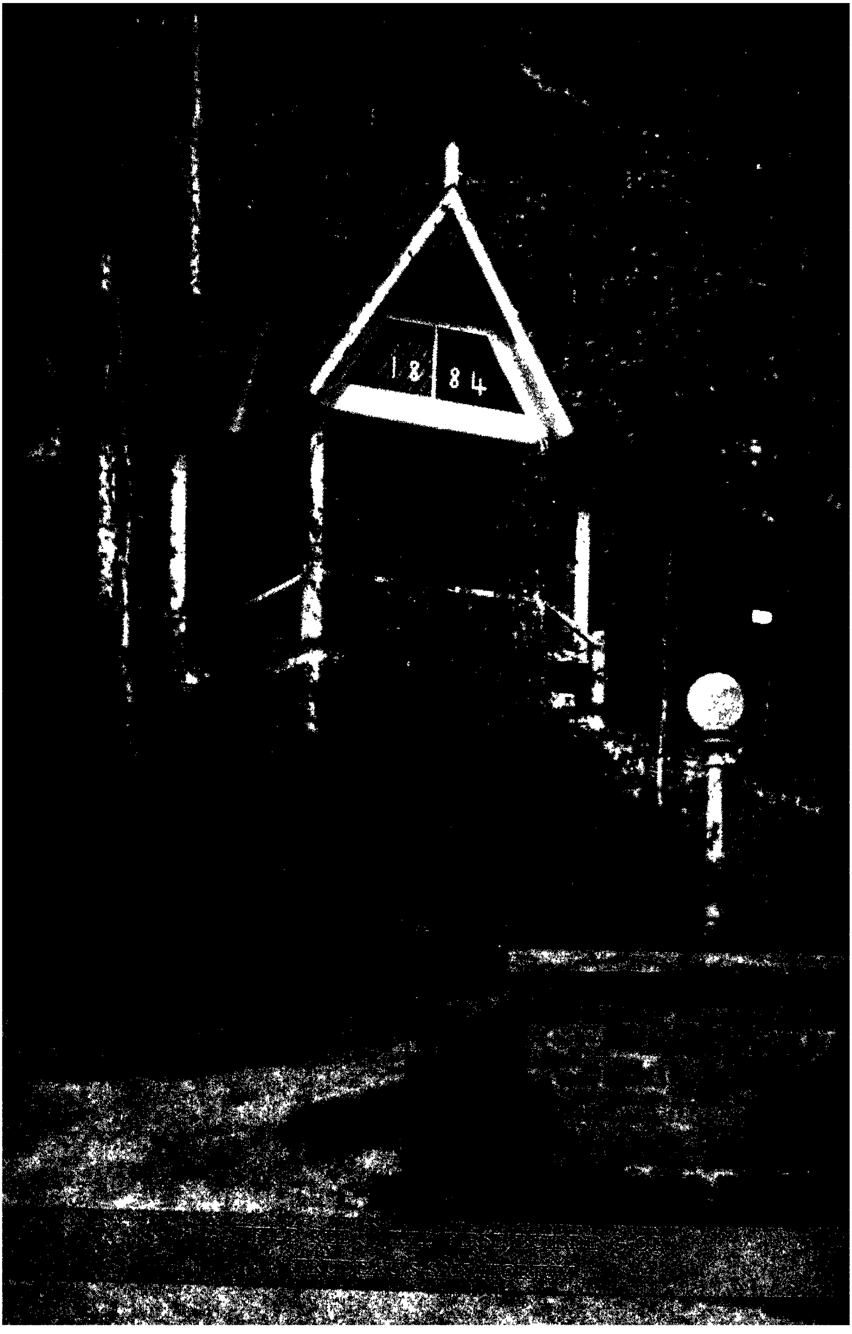
Trudeau had always liked the mountains. Instead of shutting himself in a sickroom with windows that could never be opened, he and his family moved to Saranac Lake, New York. This was a lonely place, where the temperature sometimes dropped to 40 degrees below zero. It was a strange place for a dying man to choose. But Trudeau wanted to live. He slept and rested and ate nourishing food. When he felt well enough, he hunted and fished. Gradually he grew strong enough to act as doctor to his sick neighbors.

To his family it must have seemed a miracle that Trudeau was recovering. Trudeau knew the healthful life he led had much to do with his recovery. There is a story that he fell asleep one day while he was out hunting. In his dreams he saw the edges of the lake dotted with cottages where sick people could live in the fresh air and sunlight. He decided to make his dream come true. The

"Little Red" cottage you see on page 206 was the first building of the present *sanatorium.**

Other doctors heard of this new fresh-air treatment and sent patients to Trudeau. More buildings became necessary. Trudeau lived for thirty years after the first cottage was opened in 1884. Hundreds of hospitals and sanatoriums are now treating tuberculosis by rest and fresh air. Trudeau's new method of care marked the turning point in the fight against tuberculosis. The young doctor who was expected to die before he could do any good in the world lived to be an old man, known as the beloved physician.

There are many other men and women who have worked to prevent and control tuberculosis. The Na-


1884

tional Tuberculosis Association leads the crusade in this country and in a number of foreign lands. This work is paid for by the sale of the tuberculosis Christmas seals. Your local Tuberculosis Association will answer any of your questions about this disease and show you where you can get help in preventing, discovering, and curing tuberculosis. If you ask your local or state Tuberculosis Association for helpful materials, you will find more stories of what is being done and of those who have helped to overcome this disease.

How can you use these facts about tuberculosis now?

1. You can have a tuberculin test at least once every two years. If there has been any tuberculosis in your family, you should be tested oftener. If the test is positive but the X ray shows that the tubercle bacilli are not active, you need be X-rayed only every two years.

2. You can get other boys and girls to be tested and X-rayed.

3. You can tell your parents and friends the facts they need to know about tuberculosis. They may have a hazy idea about it. Perhaps you know someone who coughs a great deal and is thin and tired. You can advise him to see a doctor. If you have a baby in your family, you want to protect him from the danger of tuberculosis. He is too little and helpless to protect himself.

PNEUMONIA

Pneumonia now causes more deaths in this country than tuberculosis. Different kinds of bacteria cause different kinds of pneumonia. The lungs and the *bronchial tubes* * leading to them become inflamed. There may be pus and a great deal of mucus, and there may be fever.

Winter and early spring are likely to be times when there is much pneumonia. What health rules are more difficult to follow in the winter than in the summer? Pneumonia is more common among young children and old people. The germs that cause pneumonia seem to enter the body through the nose and mouth and to leave it in the same way. Healthy people may have the bacteria in their throats and not be sick unless their resistance has been lowered. Being very tired, cold, and wet or being weakened by another disease may give the pneumonia germs a chance. Anyone whose resistance is lowered from illness needs to be especially careful that he does not develop pneumonia. The person who follows the suggestions for protection from tuberculosis and from colds is also gaining some protection from pneumonia. New anti-tuberculosis drugs give hope of quicker cures. But they still are on trial.

Early care of pneumonia by a physician is essential. He can decide promptly whether to use one of the sulfa drugs, *penicillin** or one of the other *antibiotics**, or serum. These drugs have reduced the deaths from pneumonia at all ages. There were more cases of pneumonia in the United States Navy in 1942 than in any year since 1918-19. But the death rate from pneumonia was the lowest in all Navy history.

There are different kinds of pneumonia. That is why the serum used for one kind will not cure another kind. The new drugs are used for all kinds.

INFLUENZA *

Influenza is another disease that affects the respiratory system. It is believed to be caused by a *virus.** One of

the dangers of influenza is that it lowers resistance and may give pneumonia germs a chance to gain a foothold.

The old name for influenza is *grippe*. The person with influenza has a fever and feels as if he had a cold. His head aches and he has pain in his arms and legs. Influenza spreads rapidly from person to person. It may occur at any time of the year; but like other respiratory diseases it seems to be more common in the winter and spring, when people's resistance may be low.

To keep the disease from spreading, people are warned to stay out of crowds as much as possible. Schools and theaters are sometimes closed to keep people from gathering. If you catch influenza, you should be very careful not to spread it. Do not breathe or cough on anyone or on food or things other persons might handle. If you have influenza, you should go to bed and stay there at least a day after your temperature has gone back to normal. Drink lots of water and two or three glasses of fruit juices. It is wise to call a doctor. After the patient begins to feel well, he should be careful not to become overtired or to do anything that would prevent him from increasing his resistance.

In the winter of 1943 some scientists brought out an influenza vaccine that had been grown in hens' eggs. This vaccine was tested in Army camps. Over 6000 men were given this vaccine, made from dead "flu" virus. Another 6000 were not given the vaccine but were watched during the flu epidemic which soon came. When the influenza epidemic was at its worst that year, 2½ per cent of those in the vaccinated group and 7 per cent of those in the unvaccinated group caught flu. This means that during a bad flu epidemic two out of three men could be

saved from the bad effects of flu by vaccine. Since that time improvements have been made in the vaccine. Flu vaccinations, already useful, will one day soon probably protect most people. As flu is caused by several different viruses, the problem is to get a vaccine that will protect against them all.

COLDS

Colds are our greatest trouble makers. When a cold is not taken care of, influenza, pneumonia, or other serious illness may follow. No other disease is so common. Three fourths of the people in the United States have at least two colds a year. Some 400 million colds occur every year. Colds cause more absence from school and work than does any other illness. Colds cost the people of the United States two to three billion dollars every year. The cost of the average cold is said to be about $15.

The direct cause of colds is a member of the germ family. This virus irritates the mucous membrane lining of the nose and throat.

The virus that causes colds is easily spread by coughing, sneezing, kissing, shaking hands and by using dishes and glasses that other persons have just used. Persons who work in an office have nine times as many colds as persons who work outdoors. Colds most commonly pass from person to person in tiny droplets. These droplets, full of the cold virus and other germs, are sprayed into the air when a person who has a cold freely coughs and sneezes. You may breathe in the trouble-making virus. If you are tired or run down, the chances are greater that the virus inside you will begin to grow and develop in

your mucous membrane. Your nose soon feels stuffed up and swollen; it begins to run. You sneeze and cough to try to get rid of the irritating substances.

In this early stage other persons are most likely to catch your cold. That is one reason why you should stay home if you have just caught a cold. Another reason for staying home in bed at the very beginning of a cold is that a single day of rest in bed is often enough to lick it. If instead you try to keep going, you may have it for two weeks. A light diet and plenty of liquids also help to cure a cold quickly.

If the cold lasts more than three days, the danger of catching other diseases is great. Along with the cold virus are other germs. If the cold virus weakens resistance, the other germs have a better chance to make trouble. That is when other diseases such as *laryngitis,** *bronchitis,** influenza, and pneumonia begin. The early signs of these diseases are so much like a cold that they are often mistaken at first for "just a cold."

People who laugh a lot and are good natured do not seem to have many colds. Scientists have not proved this, but perhaps there is something in the saying, "The surly bird catches the germ."

No one medicine will cure all colds. At best, medicines for colds only make the nose and throat a little more comfortable. At worst they may be harmful.

Anyone who is smart will follow these steps of cold treatment:

1. Get plenty of rest; build resistance.

2. Have regular bowel movements.

3. Stay home at the very beginning of a cold; eat lightly and take plenty of liquids, especially fruit juices.

4. Keep the body at an even temperature. This is easiest to do by staying in bed.

5. See your doctor if your temperature goes up or if the cold lasts more than three days.

HOOKWORM DISEASE

If you live in a part of the country where hookworm disease is common, you can help conquer it. This disease is caused by tiny worms instead of by bacteria or a virus. The disease occurs in warm parts of the country where people are careless about the disposal of body wastes.

The hookworm eggs hatch and live part of their lives in the ground as larvae. Although they sometimes enter the body on dirty hands or food, they usually enter by piercing the skin of people who walk barefoot over the ground where there are many larvae. They gradually work their way to the small intestine. There they fasten themselves to the lining of the intestine and suck blood for food. From time to time they move to a new place. Bleeding is caused from the wounds they make. The worms do not multiply inside the body, but they live for several years.

A person who has hookworm disease seems dull and slow. He tires easily, is pale, and has low resistance to other diseases. Children who have the disease may be stunted in growth, that is, not be so tall and strong as well children. People who are well nourished seem to resist the disease better than those who are not.

Public health workers have shown that hookworm disease can be prevented (1) if body wastes are taken care of in a sanitary way, (2) if the hookworm patient is treated to remove the worms, and (3) if the feet are pro-

tected by shoes. In parts of the United States public health workers examine and treat people who have the disease. Part of the health campaign is to show people the importance of following good health habits and of disposing of body wastes so that they do not pollute the soil. One of the problems in the control of hookworm disease is that many of the poor people, especially the children, go barefoot.

In one place the pupils in school found that hookworm disease was a No. 1 problem in their community. They got help from the public health officers. They helped teach everyone how to free their community from hookworm disease. They got results. The number of cases of hookworm went down from 60 to 28 per cent.

TWO GREAT KILLERS—HEART DISEASE AND CANCER

Because more and more diseases are being conquered and because the lives of more babies and children are being saved by better care, more and more people are living to be forty, fifty, or sixty years of age. They are living long enough to die of heart disease and cancer, the two main diseases of the last third of life. Heart disease kills more men than cancer, tuberculosis, or any other one disease. In women, cancer is the greatest killer; in men, it is the second. One of every five women who dies between the ages of 35 and 65 dies of cancer.

Take home this book and read these pages on heart disease and cancer to your parents. This may be the time for them to do something about these diseases, when there is a chance for cure. You yourself may be helped later by what you learn in this book about these diseases.

First you need to know a little more about the heart,

how it works, and how it can be helped to work well for a lifetime.

The heart is a strong muscular pump about the size of a person's fist. It pumps about twenty tons of blood every twenty-four hours. During twenty-four hours of hard work or excitement it may pump one hundred tons of blood. Every other organ in the body slows down for rest. The heart never stops for as long as ten seconds. Its only rest is between beats.

There are many kinds of heart disease. Each kind requires somewhat different treatment. But one treatment needed by all kinds of heart disease may be called "a way of life." That means living in such a way that the heart is kept as strong and rested as possible. Everyone should:

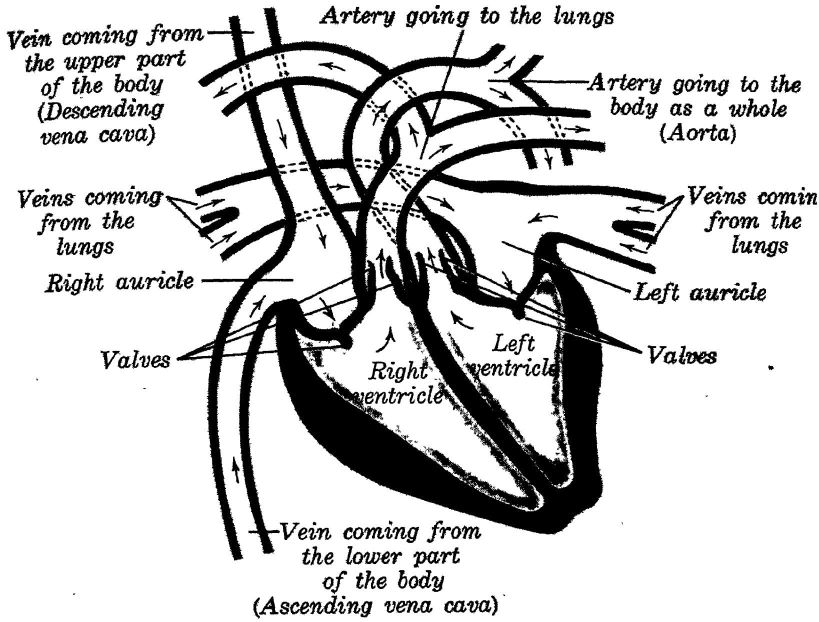
1. Have a doctor give you a health examination every year. At other times go for a check-up if you have a cough that hangs on, fainting spells, swelling of ankles, tiredness, indigestion, rapid pulse, shortness of breath, pain in the chest, dizziness, or inability to lie flat in bed.

2. Do what the doctor tells you to do. The advice friends give is often wrong.

3. If the doctor says you need rest, find a way to get all the rest you should have.

4. Try not to worry or get angry. Cheerfulness is one of the best heart medicines.

*Rheumatic fever,** which is a too common disease in many parts of our country, is often preceded by sore throat, scarlet fever, or foci of infection, such as diseased tonsils. Rheumatic fever kills many children every year and damages the hearts of many others. Bacteria settle in the valves of the heart and cause them to do their work poorly. Any child who is weak, thin, and nervous and



THE HEART AND LARGE BLOOD VESSELS

Follow the flow of blood from the vein coming from the uppe part of the body through the heart and out through the arter called the aorta.

who has sore joints or frequent nosebleeds should be examined by a doctor as soon as possible. He may have rheumatic fever. People who have rheumatic fever need special care and a long, long rest in bed.

In rheumatic fever and other kinds of heart disease the person who has learned to rest and take life as it comes—both the bright and the dark—lives longest.

Cancer is a disease to be prevented and cured, not feared. We do not fear things we understand and can do something about. Marie Curie, who did so much toward giving *radium* * to humanity, said: "Nothing in life is to be feared. It is only to be understood." Old-fashioned

people used to be ashamed of having cancer. Now we are no more ashamed to have cancer than a broken leg or pneumonia.

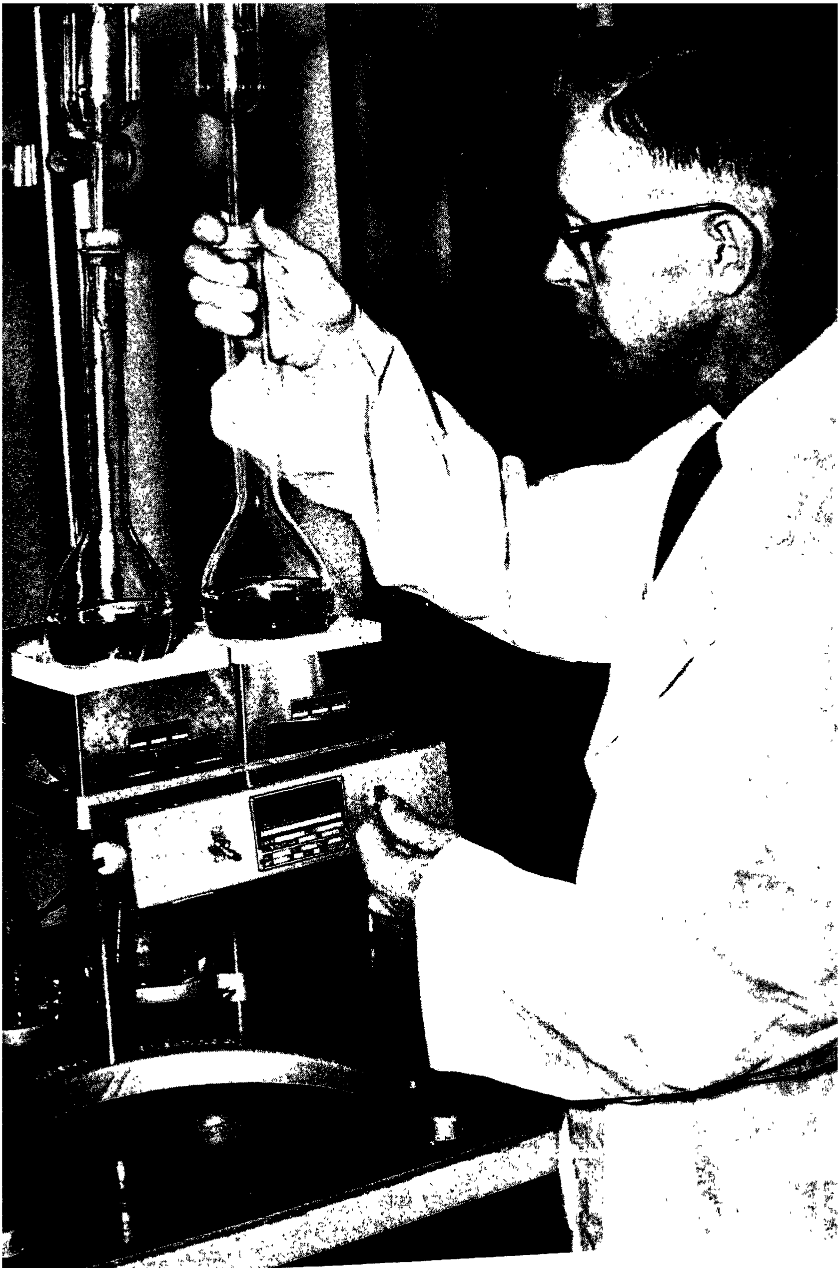
Every cancer passes through a stage when it can be cured by X ray, by radium, or by an operation. If the cancer is detected in the beginning stages, the chance for cure is near 100 per cent. There is no reason to fear X-ray or radium treatments, for these are given with such skill now that no healthy cells are injured.

What is cancer? As you know, the body is made of billions of cells. Each group of cells has a special job to do. Cancer is one's cells gone wrong. Cancer cells have no special job to do. These cells grow much faster than the other body cells. Since they cannot be fed fast enough, they break down. Some of them may get loose and start growing in other parts of the body: Early detection and treatment prevent the wandering of wild cells through the body.

How is cancer caused? Cancer cannot be spread from one person to another. It is probably not caused by a single blow or bump, but it may be caused by constant irritation. It is not clearly proved that it is passed from parent to child. But some families seem to be more susceptible to cancer than others. No single cause of cancer has yet been discovered. Many causes, each in its own way, change normal cells to cancer cells.

How can cancer be detected early? The best way to detect cancer while it can still be cured is to have a yearly health examination. After persons are 45 years old they should have a health examination at least once a year.

There are several danger signals men and women should watch for, as any one of them might mean cancer:



Scientists make tests to determine the different elements in food.

1. Any lasting lump or thickening in the body

2. Any irregular bleeding or discharge from any body opening

3. Any lasting and unexplained indigestion

4. Any sore that does not heal normally, especially about the tongue

5. Any sudden change in the form or rate of growth of a mole or wart

6. Hoarseness that lasts over two weeks

7. Loss of weight

How is cancer cured? The cancer cells must be removed in the early stages. Certain skin cancers can be treated by radium or X ray. No medicine taken by mouth will do any good. In fact, it does harm if it causes delay in getting the cancer cells removed or their growth checked by radium or X ray.

There is still much to learn about the growth of cells and how cancer cells get started growing. Scientists are studying this in many laboratories. We now know that cancer, if detected early, can be cured. In some cases it is curable when detected late. But the earlier the cancer is detected, the greater is the chance for cure.

POLIO

If there is a polio "scare" in your town, don't be frightened. Just do what the health department says:

Be sure to wash your hands before eating and handling food, and after going to the toilet; keep clean.

Play with your friends at home or on a nearby playground; don't travel or go to crowded places.

Swim only in approved places; don't get chilled or overtired.

NEW MIRACLE MEDICINES

One of the exciting discoveries in modern medicine is the antibiotics. It had long been known that germs fight germs. Now scientists have found a new way of making micro-organisms fight for us.

Penicillin was the first of these antibiotics to be discovered. It is still the most useful drug for most forms of pneumonia, tonsillitis, and scarlet fever. But it causes a skin rash in some persons and should be given only by a physician.

*Streptomycin** kills some germs that penicillin does not kill. It is most useful in certain cases of tuberculosis and infection of the intestine. *But* in some cases this drug has caused deafness. It, too, should be used only under the watchful eye of a physician.

*Aureomycin**, *chloromycetin,** and *terramycin** will cure some infections, like typhoid fever and typhus fever, which the other drugs do not help. *But* these drugs may harm the organs that make blood cells.

So you see these life-saving drugs must be used with caution. They can harm you as well as cure you. You should not take them for a common cold or for a disease which they are not known to cure. Why not? Here are some of the reasons:

They may be harmless the first time you take them, but not when you take them again and again.

They may get rid of the bacteria that are most easily killed and leave the tough ones to grow and flourish and cause illness later.

They may just stop the fever, which is only a sign that something is wrong.

Things to Do

1. Find some other stories about men who have helped people to have better health. Tell these to the class. Make some of them into short plays.

2. Ask your teacher if the class may write for materials on the work of the National Tuberculosis Association and other health organizations

3. Bring to class health clippings from newspapers. Are these good sources of information? If your library has the magazine *Hygeia,* you will enjoy its articles and pictures. There are stories in *Hygeia* written especially for boys and girls. Select the best pictures, stories, and articles for your class file of health information.

4. Did you wash your hands before lunch today? Yesterday? Did you cover your mouth and nose with a clean handkerchief when you coughed or sneezed? Why are some simple habits hard to form? Perhaps you have learned to play the piano or the violin, to swim or ride horseback, or to typewrite. These are all difficult skills to learn. You can surely learn the simple skills of disease prevention. Set yourself a goal this week to form, if you have not already done so, the habits (1) of keeping your fingers, pencils, and other objects away from your face and out of your mouth, (2) of washing your hands and face before touching food, and (3) of covering your nose and mouth when you sneeze or cough.

5. Ask the science teacher in your school to help the class prepare four small covered glass dishes of material in which bacteria grow well. Such material is called a *culture medium.** Gelatin is often used. With the help of culture media scientists have discovered many of the *microorganisms* * that cause well-known communicable diseases. Perhaps your class can do these experiments:

Dish I. Wash the end of your pencil in a little water that has been boiled and has cooled. Put a drop of this water on the culture medium in the first dish.

Dish II. Cough or sneeze over the culture medium in the second dish.

Dish III. Rinse one finger and clean the nail in a little water that has been boiled and cooled. Put a drop of this water on the culture medium of the third dish.

Dish IV. Keep this dish covered all the time.

Put the four dishes in a warm place. Look at them after two days. What do you see? Do you find spots on some of the culture media? These spots are colonies of bacteria—hundreds and thousands of bacteria close together. Otherwise you could not see them. Where did they come from? What kinds of bacteria are they? You cannot answer the last question without a powerful microscope and a great deal of study. Many of these bacteria are harmless. But there may be in the colonies germs that might cause colds or sore throat. There may be some that might cause typhoid fever or other *intestinal* * diseases.

What does this experiment show about the importance of keeping pencils, fingers, and other objects out of the mouth? About washing the hands and face before eating and about covering the mouth when you sneeze or cough?

Read about bacteria in other books.

6. Visit a food factory in your neighborhood if you may and take note of all the workers do to prevent bacteria from getting into the food they are preparing.

7. What are the laws regarding pasteurization of milk in your community? What are the conditions under which certified "raw" milk and pasteurized milk must be produced and handled? What is your responsibility for keeping the milk safe?

Problems to Solve

1. In a study of germs on handkerchiefs, scientists took handkerchiefs that had been used two days by sick persons and then dried. They shook these handkerchiefs just as a person using them might. On each of the handkerchiefs many germs were found. These germs had not been killed by ordinary disinfectants used in hospitals. Using dirty handkerchiefs is one of the surest ways to spread germs. Clean handkerchiefs are a "must."

What can you do about this problem? How can you keep germs from being spread by soiled handkerchiefs? What are possible solutions?

How much does a box of paper handkerchiefs cost? How many handkerchiefs are there in a box? What is the cost of one paper handkerchief? Which is cheaper: to use plenty of paper handkerchiefs or to make yourself or others sick by spreading germs? What is another good reason for using paper handkerchiefs, especially when you are ill?

2. Patty said, "I never worry about getting sick myself. I'm healthy as can be. But I do worry about Mom and Dad getting sick. When Mom's sick, the house isn't the same any more. When Dad's sick he can't go to work and we don't have enough money to buy the things we need." This is a real problem. How could Patty help solve it?

Choose the Correct Ending

Complete correctly Alexander's statements about the war against infection and illness. Discuss these in class.

1. Since 1900 the death rate from tuberculosis has been
   - rising.
   - falling.

2. The tuberculin test and X rays are used to
   prevent tuberculosis.
   cure tuberculosis.
   show if a person has tuberculosis.

3. Poor food, fatigue, and exposure to cold and wet
   may make one susceptible to tuberculosis.
   may cause tuberculosis.

4. Trudeau helped in the conquest of disease by
   inventing the stethoscope.
   discovering the tubercle bacillus.
   using the fresh air and rest treatment.

5. At present the best way to protect oneself against pneumonia and influenza is to
   gargle one's throat.
   build good resistance.
   wear shoes.

6. Hookworm disease is caused by
   virus in the nose and throat.
   poor diet.
   worms in the intestinal tract.

7. The greatest killer of women and the second greatest killer of men is
   heart trouble.
   cancer.
   tuberculosis.

8. To keep well, it is important that we
   worry about catching polio and other diseases.
   always think about germs and diseases.
   think about positive health, truth, and joy in living, not about sickness.

INTERESTING BOOKS

BENZ—*Pasteur, Knight of the Laboratory*
EVANS—*The Doctor Is Coming*
FITZPATRICK and BAIN—*Living Things*, pp. 265-302
SCHATZ and RIEDMAN—*The Story of Microbes*

UNIT VIII

PERSONAL APPEARANCE

First impressions are important—the way you sit, stand, and walk, the way you look and listen and talk, the picture you give of health and vitality. You make a good impression if you have good posture, eyes free from strain, alert ears, a pleasant voice. Good posture helps you to stand and move with ease. Good eyes and ears protect you from danger and help you to be alert.

"What has she got that I haven't?" Polly thought as she saw one of the good-looking older boys go up and talk to Joan Davis. "I'll find out," Polly decided. So she looked at Joan more closely and this is what she found:

Joan was always clean—her hair was clean and shiny; her hands and nails were always clean; her skin had a fresh, scrubbed look. Her clothes were clean and becoming and she wore them well. She listened with interest. She laughed readily. She was kind to everyone.


WHY IS THIS A POOR KIND OF POSTURE FOR EVERY DAY?

"HE'S STRAIGHT"

Have you ever heard the expression, "He's straight"? It means: "He's honest. You can trust him." People who *stand* straight usually give the impression of *being* straight. What first impression do you have of a new boy or girl in school who has excellent posture? What first impression do you have of a boy or girl whose head drops forward and whose shoulders are rounded?

Have you ever thought that your posture affects other people in the same way that their postures affect you? Employers often judge boys and girls who apply for work by the way they sit and stand and walk. When employers and other people see a boy or girl who sits and stands well, they think, "He is alert," or, "She is a capable person," or, "I think he will do good work," or, "Good health and good posture often go together," or, "It does me good to look at her." Sometimes a really capable person loses a good position just because his posture gives the impression that he is careless and sloppy. Can you afford to let careless posture make a poor first impression?

What are some other advantages of good posture? It helps to give you greater confidence in yourself. Good posture makes you *feel* more capable. You are more alert and have more self-respect when you sit or stand tall. Next time you hear someone make a speech notice how he stands. A good speaker walks to the center of the platform as if he were at home there. He stands tall and moves easily. The people who are listening to him like him because he looks capable and alert. They believe he has something interesting to tell them.

You can use this same method when you make a report or in your class recitations. Try to slide out from behind your desk without stepping on your own feet. Stand well. See if you do not give better reports and recitations. When you stand well, your voice will come out more clearly. The class will hear you better. Anyone who is uncomfortable or who feels a little frightened can help himself by standing well and taking a few quiet, steady breaths.

Good posture makes you more attractive and graceful. One of the first things actors and actresses learn is to stand and walk well. Movie stars cannot slump or slouch. They are trained to move easily. Good posture makes you feel much lighter. Learning to be light on your feet makes you a better dancer.

Here is a suggestion for girls, although boys sometimes need it, too. Good posture makes you look well dressed. The most expensive and most stylish clothing is spoiled by poor posture.

Another advantage of good posture is that you feel happier when you stand well. Do you expect a smile on the face of a person who drags his feet and lets his head and shoulders sag? Such a person looks sad and discouraged. He probably feels sad. Should you ever catch yourself feeling cross or unhappy, straighten up and see how much better you feel.

Good posture not only makes a person *look* more capable; it also helps to *make* him more capable. Work of any kind can be done more easily by a person who carries himself well. Poor posture and fatigue go hand in hand. Fatigue leads to poor posture, and poor posture is fatiguing. You not only slump into poor posture when you are


DO YOU THINK MARY WILL GET A JOB? NOTICE HER POSTURE.

tired, but you also become tired when you sit and stand and move about in poor positions. Most coaches of athletic teams choose players who have good posture. They believe that their teams will then be able to play the game with greater ease and skill.

The effect of very bad posture on the lungs and other organs is well known. Rounded shoulders and a slumped position may interfere with the lungs in breathing, and they may do harm by crowding other organs out of their natural places.

There is evidence to show that digestive disturbances and failure to gain in weight are also sometimes related to poor posture. In some cases weight has increased and digestive disturbances have decreased when posture was

improved. Good posture may also aid regular daily bowel movements.

How can you learn to have good posture? First get a clear idea of what good posture is. Look at pictures of persons who carry themselves well. Practice posture like theirs.

Look at yourself in a long mirror. Do you like your present posture? Say, "Brace," to yourself. What did you do? Did you stiffen your muscles and throw back your shoulders? That is not the kind of posture you want. Good posture is not stiff posture. Good posture is a comfortable way of sitting, standing, and moving.

Try these directions:

Weight forward and on the outer borders of the feet, toes pointing straight ahead. Knees relaxed—"knees easy"—chest pulled up and forward. Reach up with the top of your head, keeping your chin level, not out.

Are you standing tall? Do you feel comfortable in your standing position?

Some people find that all they need to do to stand tall is to hold in the muscles across the stomach and just beneath it. "Suck in your stomach" is the Navy's direction. When the stomach muscles are allowed to go loose, you are likely to slouch. When they are held in, your chest comes up, your weight shifts forward on the balls of your feet, and you stand well. The muscles should be drawn in only enough to make you feel comfortable and alert, not as if you were trying to make yourself hollow.

Now sit, giving attention to each of the following points:

Feet on the floor—heels and toes both resting on the floor; legs bent to make right angles at your knees;

chest up and forward; lower part of the back touching the back of the chair and bending slightly forward from the hips; head high, chin level.

Are you sitting tall? Do you feel comfortable? Do you look alert, capable, and interesting when you sit according to these directions? Do you also feel alert?

Without thinking we sometimes do things that cause poor posture—such as standing too long with the weight on one foot, sitting on one foot, always carrying books and packages on the same arm. Our muscles grow the way we train them. That is why we want to train them in the way they *should* grow.

There is no one best posture for everyone. Since you are built differently from other people, your posture will be different. But it will be a good-looking, comfortable posture for you.

If you are healthy and happy and have clothes and shoes that fit you and bring out your good points, you will just naturally have good posture. The way you feel will show in the way you sit and stand, the way you walk and play games.

Every kind of game can be played in good form or in poor form. Do you know what is good form in the games you play? Look at the pictures of outdoor play in this book. They show several kinds of good form. Try to imitate these whenever you play these games. Skill in sports is about the same as good form. Good form requires the correct posture for each activity.

Exercise may be healthful or harmful. It is healthful when it is a suitable kind of exercise for you and when you have learned the correct form. It may be harmful if it is done awkwardly and with a feeling of strain. It is

an aid to good posture to do suitable exercises to strengthen the muscles that hold the body in an upright position. Your physical-education teacher will give you exercises of this kind. Muscles may also be strengthened by playing active outdoor games.

But it is not enough to want to have good posture and to practice sitting, standing, and playing in the correct positions. If your muscles are weak, you will not be able to hold these positions. Another suggestion for good posture is to eat the right kinds and amounts of food. Good posture depends, in part, upon strong muscles. Strong muscles depend, in part, upon the right kinds and amounts of food.

Fatigue causes poor posture. Have you noticed the TV slump? Remember, many muscles must work to keep you sitting up. They get rested when you sleep ten to eleven hours each night.

Eyes make a difference in posture. If you have to bend over to see the book or the TV screen clearly, your muscles learn to hold you in that position.

For good posture you should also choose chairs and desks of the right height. Your chair should be of such a height that your feet can rest comfortably on the floor. Your table or desk should be of such a height that your elbows are at the level of the desk when you are sitting with your arms hanging naturally at your sides. Find a way to have furniture that fits you.

Another aid to good posture is to find work that you can do well and then give your attention wholeheartedly to it. You can often tell when a person is discouraged by the way he sits, stands, or walks. Success helps posture. How do you stand when you get 100 per cent on your

arithmetic paper? There is a story of a Frenchman who had very poor posture. His wife brought him to the doctor. The doctor gave him a medal of honor to wear, and the man at once began to stand up straight. His poor posture was cured by increasing his self-confidence.

"HE'S KEEN"

"He's keen" means: "He's quick to see and hear things." "He's alert." "He knows how to look and listen." To be keen, you should have good eyes and good ears.

Did you ever see a cat that had eyestrain? Probably not. Cats, like other animals, use their eyes when they need to, then rest them. We should learn to use our eyes without strain. To prevent eyestrain:

Read in a good light—not one either dim or glaring.

Rest the eyes often by looking into the distance and following moving objects. Do not stare steadily.

In viewing TV, sit about ten feet from the screen, which should be at eye level. One hour at a time is long enough to look at TV, even with good eye care.

Keep infection away from your eyes by not touching them with dirty fingers, any towel or washcloth except your own clean one, or any other object that might have germs on it.

Have an eye examination by an oculist at least every two years even though you seem to be having no eye difficulty. An oculist is a doctor who has added the study of the eyes to his knowledge of diseases and the body as a whole. Eyes are a part of the whole body. Good health helps the eyes. Good eyes help general good health.

How well do you hear? Do you know? If not, you can take a hearing test. It can be given to the whole class.

What makes a person hard of hearing? The ears may be stopped up with wax or by a cold. This is not serious—unless you try to treat it yourself and get the middle ear infected or injure the eardrum.

If you are hard of hearing, you need not feel different. Learn lip reading. Wear a hearing aid carefully fitted to you.

Things to Do

1. Which is the best walking posture in the above picture?

2. How are you sitting now? Are your heels and toes resting on the floor? Is your head high, your chin level? Do your legs form right angles at the knees? Is the lower

part of your back touching the back of the seat? Are you holding your book up at least twelve inches from the eyes?

3. Ask your teacher to give you a posture test and also suggestions for improving your posture if you need them.

4. Look at the heels of your shoes. Are they even and level or are they run down at one side? If the heels are not even and level, have them made straight and see if your posture improves. Get a shoe-repairing kit. Learn to repair shoes. Have a shoeshine kit in school so that you can polish your shoes. Then they will last longer.

5. If you or someone you know cannot seem to "snap out" of poor posture, try to find the causes. Is it because of poorly fitting, unattractive shoes and clothes, or lack of sleep, or a poor diet, or infection somewhere in the body that a doctor can discover? Or is the poor posture caused by feeling unhappy or discouraged?

Discussion Questions

How many of Marilyn's statements are correct as she has written them? How would you change any that you think are not true? From your eight correct sentences choose one sentence and write a paragraph about it.

1. Good posture helps you to make friends and get a job.
2. You should judge people by their posture.
3. Good posture is stiff.
4. Good posture when you are sitting, standing, and walking aids health.
5. Tall boys and girls should not stand tall.
6. All exercises improve posture.
7. When you are tired, standing tall adds to fatigue.
8. You should blow your nose gently, so as not to force germs from the nose into the middle ear.

SAFETY

Some boys say, "Safety is a sissy," but bright boys and girls say, "It pays to be careful."

Some persons have accidents because they do not know what to do. Some persons have accidents because they are careless and do not think. This unit will show you how important it is for you to learn to prevent accidents. There is a great deal that we can all do for the safety of ourselves and the persons about us.

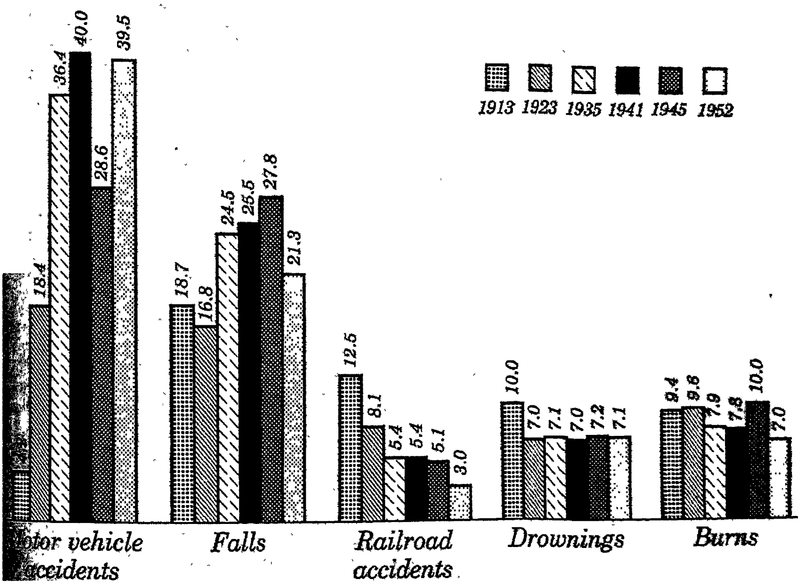
[illegible] RULES DO [illegible] FOLLOW ON STEEP HILLS

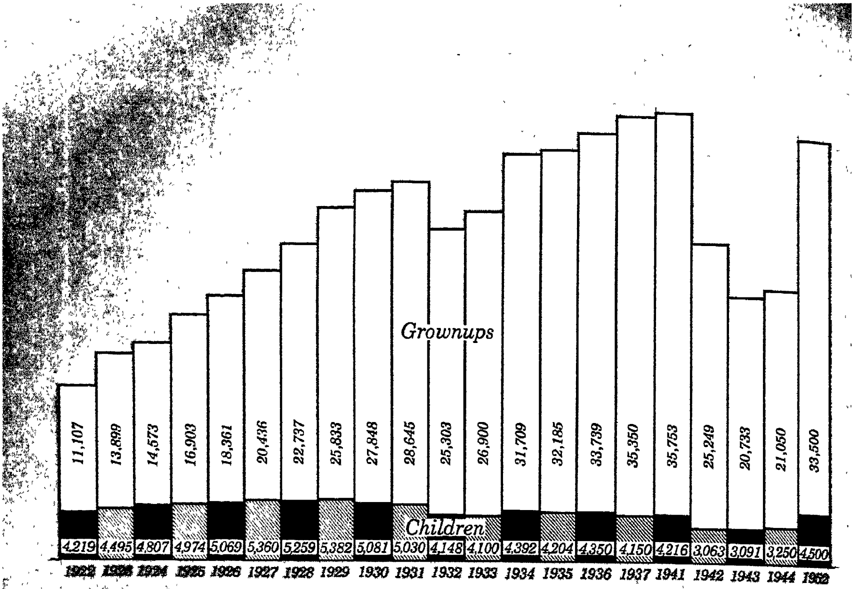
THE PROBLEM OF ACCIDENTS

Can you imagine how many eight billion, seven hundred million dollars are? In figures it looks like this: $8,700,000,000. Perhaps you have wished you were a millionaire. Eight billion, seven hundred million dollars would be enough to make eight thousand, seven hundred millionaires. This huge amount of money is said to have been the cost of accidents in the United States in a recent year. The actual cost was probably more than this amount. Safety saves money. Carelessness causes waste.

How large is the town in which you live? There are many towns of 10,000 people. Imagine ten towns of this size. If practically all the people in these ten or eleven

WHICH KINDS OF ACCIDENTS HAVE INCREASED SINCE 1913? WHICH DECREASED? WHICH STAYED ABOUT THE SAME?





DEATHS FROM AUTOMOBILES

towns were destroyed, the total number would just about equal the number of people killed by accidents in the United States in one year.

You can see from the chart above that during the years 1922 through 1941 the deaths from automobile accidents increased greatly for grown people.

But the year 1922 was an important one in safety history because it was the time when safety classes were beginning to be held in schools throughout the United States. The death rate from accidents for school-age children 5 to 14 years was about 25 per cent less in 1945 than it was in 1922. Up to 1952 there has been little change. Boys and girls like you are winning the fight for safety. But the number of deaths of young people 15 to 24 years of age from automobile accidents has gone up again.

WHY ACCIDENTS HAPPEN

What causes so many accidents? One cannot remedy any evil until he knows its cause. You know the general cause of accidents. But knowing the general cause does not help you very much in preventing accidents. If you knew the causes more definitely, you might avoid doing what leads to accidents. Let us see what can be done to prevent accidents that occur at school and during play.

Records of accidents that happened to a number of school children suggest ways in which we can avoid accidents. The accidents studied are listed here. What might have been the cause of each of these accidents? Tell how you think each accident might have been prevented.

ACCIDENTS WHILE PLAYING

Foot stepped on while playing ball
Eye hurt while playing ball
Arm bruised by fall on concrete while playing ball
Deep scratch on leg caused by fall while playing ball
Finger sprained, hit by baseball
Ankle sprained while playing ball
Arm broken while roller skating

ACCIDENTS WITH GLASS, TIN, AND KNIVES

Cut with knife
Finger cut on tin can
Finger cut on piece of broken glass
Cut while playing with open penknife

ACCIDENTS WITH FIRE

Burned while building a fire in a stove
Spilled hot coffee on leg
Burned when standing too close to open fireplace

Cut or bruised when riding on running board of an automobile

Badly hurt when a speeding automobile upset

Arm broken when bicycle ran into an automobile

Sprained ankle when stepping from streetcar in motion

MISCELLANEOUS ACCIDENTS

Finger caught in swinging door while hurrying

Ankle sprained by falling down steps

Head cut in fall from a ladder that slipped

In studying these lists you probably have discovered the most important causes of many kinds of accidents. Let us summarize them.

1. Acting in unnecessarily dangerous ways. Danger lurks in certain activities. A large number of accidents, for example, are caused by hanging on to the back of a truck or "hooking" a ride with a sled. Such accidents could be prevented by putting a good type of adventure, such as skating or playing ball, in place of dangerous activities. Clever boys and girls invent and discover new adventures of a safe kind to replace dangerous activities.

2. Speed. "Haste makes waste." Haste causes many accidents. When you are in a hurry, you take chances that you would not take if you had plenty of time. When you are in a hurry, you are often troubled and bothered about other things and pay less attention to where you are going. When you are going fast, you cannot stop quickly. The boy who ran into an automobile on his bicycle might have been able to stop or turn aside if he had been going slowly. The girl who sprained her ankle when stepping from a streetcar probably was late and

SCOUTS KNOW THAT IT IS SENSIBLE TO FOLLOW SAFETY RULES.

thought only of reaching as soon as possible the place to which she was going.

3. Fatigue. When workers in factories are tired, they have more accidents than when they are rested. When you are tired, you are less alert. You do not notice signs of danger. You do not think so quickly or make so accurate judgments. You do not "have your wits about you" so fully as when you are rested. The boy who fell from a ladder may have been too sleepy to make sure it was securely braced. It takes keen, wide-awake people to avoid accidents. In order to avoid accidents, people have to see clearly, they have to think accurately, and they have to act quickly in hundreds of daily situations.

4. Worry and discouragement. Worry fills the mind with thoughts of the past and the future. Accidents happen in the present. Discouragement leads to a "don't care what happens" attitude that may result in accidents. Some of the cuts and burns listed might easily have been caused by worry or discouragement. They might have been avoided by wholehearted interest in and attention to the present activities.

5. Lack of skill. Many of the accidents people have while playing games are caused by lack of skill. The skilled player has control of his muscles. He sends the ball directly to the spot where it should go. He does not bump into other players. He does not fall down in a clumsy way. The skilled baseball player does not sling his bat away from him as he runs to first base. He drops it at his feet. The skilled volleyball player does not hit another person in the eye. He has such control over his movements that he hits the ball, not another person.

6. Lack of obedience to the rules of the game. Almost all games have rules that are safety rules. In hockey, for example, there is a rule that the hockey stick shall not be raised above the shoulder. What is the reason for this rule? What other rules for games are safety rules?

Girls' rules for some games are different in some ways from boys' rules. In boys' basketball the players may run all over the court, but in girls' basketball the rules require the guards and forwards to stay within certain lines. Girls should use girls' rules in the games they play.

7. Not heeding warnings. Why do you slip on ice, on a polished floor, or when you have on a pair of new shoes with smooth leather soles? If you looked closely at

SKILLED HOCKEY PLAYERS KNOW HOW TO AVOID ACCIDENTS.

the place where you are walking or running, you would see things that might trip you—stones, pieces of wood, tools, and toys lying around. Things left on the stairs are particularly dangerous. Why? Broken bottles and boards with nails sticking up in them often cause serious accidents. Always pick such things up before accidents occur.

After you have walked in your new shoes for a while, the smooth soles grow rougher. Then there is more friction and you are less likely to slip. Sometimes mothers make light marks with scissors on the soles of small children's new shoes. These help to keep the children from slipping and falling. Shoes with rubber soles often have ridges or raised places to give more friction with the pavement. Gymnasium shoes often have rubber soles with ridges that help to prevent skidding. Did you ever try to dance in tennis shoes? What happened?

Ice is smoother than the pavement. When you step on ice, there is little friction to hold your foot firm. To make matters worse, the rubbing of the shoe melts a little of the ice. The drops of water on the ice make the friction still less. The sole of your shoe is no longer held down by friction. You slip and slide. Why do people put sawdust or ashes on ice?

A waxed floor also is very smooth. It has almost no friction. That is why a waxed floor is easy to dance on and hard to walk on. A bathtub, too, is rather smooth. When it is dry, it is not very slippery. When it is wet, there is a thin layer of water between the tub and your feet. There is practically no friction to hold your feet to the tub. That is why it is easy to slip and hurt yourself in a wet tub or on the floor of a shower room.

Every slippery place, like every other dangerous place, should be a *warning:* "Take care!"

8. Alcohol. Alcoholic drinks cause many accidents. In one city alone, during a recent year, 1000 pedestrians who were hurt in automobile accidents were reported as intoxicated. "Physical defect" and "driver asleep" were each reported less than one tenth as frequently as "driver intoxicated." One sixth of the causes for taking away drivers' licenses in one state were stated as "driving while intoxicated." Alcohol makes a person act less quickly than he usually does. That is one reason why accidents are more likely to happen when a driver has been drinking alcoholic beverages. He does not see danger quickly. He does not act quickly after he sees the danger. Anything that makes a person careless, inattentive, or slow to act in case of danger may be the cause of a serious accident.

The chief causes of accidental deaths to children are automobiles, drowning, burns and scalds, and falls. A great many boys and girls of your age have accidents in the school buildings and grounds or during play. How many of these might have been prevented, do you think?

Let us discuss some of the safety problems you have from the time you come to school in the morning. Although all problems and ways of preventing accidents will not be exactly the same in every school, the ones mentioned here are common in most schools for boys and girls of your age. From your study of these you will be able to figure out the solutions to any special problems in your school. You should try to solve the safety problems in your school as you study this part of the book.

Probably you now leave your wraps in a locker instead of hanging them in a cloakroom. You need to be careful to avoid pinching your fingers in the locker door, pulling books down onto your head or toes from a high shelf, or bumping into people hurrying to open their lockers. Pushing and crowding around lockers is bad manners and wastes time for everybody. Close your locker door. Then no one will run into it. Pick up any pencils or books you drop. They might cause a fall. It is wise to keep your eyes open for things other people may have dropped near the lockers; then you will not stumble over them.

Instead of spending most of your time in one classroom, very likely you now move about. You have to learn good form in halls and on stairs. You will want to keep in line if your school halls are crowded. You will keep to the right. If you have to carry books with you, hold

them to one side. This gives you a chance to see where you are walking and leaves one hand free to hold the stair rail. Stray pencils have caused falls on stairways. Wastepaper may not cause an accident, but it keeps your school from looking orderly. So pick it up, too.

How many of these good safety habits do you have?

1. Put your weight on the ball of your foot when you are going upstairs.

2. Place your entire foot firmly on the next step before you take the weight off your other foot when you are going downstairs. In other words, there should be no running on the stairs.

3. Take only one step of the stairs at a time even when you are in a hurry.

4. Keep the hand next the rail free.

5. Keep your hands out of your pockets. (Can you explain why this is a good rule?)

6. Do not run, push, or scuffle on the stairs.

7. Girls: do not wear high heels to school.

8. Keep your shoestrings tied and do not let strings or belts hang down by your feet.

9. Keep all loose objects off the stairs.

10. Hold any sharp-pointed or glass object away from your body, point down.

11. Carry books or bundles to one side.

12. Avoid talking or laughing so much that you do not notice where you are going.

13. Avoid blocking the stairs while other people are trying to pass.

14. Keep to the right on and near the stairs.

15. Look about the stairways and remove anything that might cause an accident.

In classrooms keep the aisles clear. When your feet are under your desk, no one will trip over them and you will find it easier to get up from your seat. Be careful not to bump into people or desks or to catch your clothes on doorknobs or furniture. Steam pipes and radiators may burn the person who gets too near them. Avoid sitting on window sills or leaning out of windows; doing so has sometimes resulted in falls.

You may have a school auditorium. This is a place to practice the same safety rules that apply to theaters. If you march in as a class, keep in line. Otherwise follow ordinary rules for safety in halls. The floor probably slants. There may be a low step up from the aisle into the row. Carry any books high enough not to hit the heads of those seated in front of you. When you open seats down or fold them up, be careful not to get your fingers caught.

There is another danger from folding seats. Bill Gibson liked to sit hunched up with his toes in the crack of the seat ahead. One day in assembly he was busy watching what was going on and did not notice that the row in front was filling up. Pete, one of the boys coming into that row, thought Bill saw him. Pete opened the seat ahead of Bill and sat down. Bill's foot was caught and the bones of two of his toes were cracked. Pete had not meant to hurt Bill. Neither boy was paying attention.

Sometimes your class may give programs or plays for the rest of the school. Your auditorium may have a platform or a stage with curtains and dressing rooms. Avoid tripping or stumbling on the steps around the stage or in the spaces backstage. Keep the floors of the dressing rooms clear and be very careful not to push or bump the other people waiting to go onto the stage. There is often

only a small place to wait, and heavy electric cords may be hanging down or laid along the floor. Quietness, order, and good manners backstage help everyone feel at his best when he goes on the stage. They also prevent small accidents, as well as more serious ones.

For many of you the school cafeteria may be new in your school life. A few boys and girls seem to think that they have to race and push to be first in line. Naturally you are hungry at noon. Naturally you enjoy the change from class. Yet you will have a pleasanter lunch hour and will actually save time if you do not race around like a half-starved person. In many schools some pupils are having class while others have a lunch period. Noise disturbs other classes.

You should wash your hands before eating. Perhaps you can leave your books in your locker. It will be easier to handle your tray if you have both hands free. Those who carry their lunch or bring part of the lunch from home have to go to their lockers anyway. Hurry and excitement slow digestion. Keep in line until you come to the food counters. You can have fun laughing and talking quietly with those next to you in line.

Now is your chance to put in practice what you have been learning about choosing good meals. Try to look down the counter to see what is being served so that you can plan what to buy. The person who takes a long time to make up his mind is unfair to others behind him. A little practice and care will enable you to set dishes on your tray in such a way that they will not slide or tip over. Slide your tray, or carry it, steadily and firmly without bumping anyone or any other trays. Look where you are going and balance your tray carefully as you go.

It takes only a moment to arrange your place attractively and thus make the meal pleasanter. If you take the dishes off your tray, place the tray where it will not be in anyone's way as people pass through the room. Take time to chew your food and to enjoy the break in the day. This aids digestion. Your school cafeteria should be as orderly as a public restaurant. No well-mannered boy or girl throws food or paper napkins. Shouting and making a great deal of noise make meals less pleasant. Be careful not to scatter crumbs or spill food and water. It is easy to slip or fall on a wet or greasy spot.

How you spend the rest of the lunch period varies from school to school. Suggestions for safety in games and on the school grounds will be part of our next section. You will want to wash your hands, get your books, and be ready for your first afternoon class.

Other new adventures come in shops, laboratories, and home-economics classes. You have to learn how to use the tools and equipment. Safety there, as in other places, depends on knowing what you are to do, how to do it, practice, and attending to the job. Your teacher explains what you are to do and shows you how to use the tools. Listen carefully and follow instructions. If you are not sure about something, ask your teacher. He watches to see that you are working safely, but he cannot stand beside you all the time. You have to do your part. When you are supposed to wear aprons, goggles, or gloves, be sure to wear them. They are necessary for your safety.

The shops are places to work, not play. Running around, bumping into people who are using tools, or playing practical jokes may cause accidents. Tools are sharp. Always cut away from you. Watch your fingers,

and roll up your sleeves if they are likely to get in your way. Loose clothing caught in machinery will pull you into danger. Be very careful of any tools that are run by motors or other power. Wait until your teacher says you may use them. Have your wood or metal in place first and see that the guards, safety bars, or safety wires are in place.

The skillful workman keeps his tools in good condition. He learns how to use them and which ones are best for a certain job. He keeps his bench neat, picks up from the floor any tools that might cause cuts or falls, and puts everything away in good order at the end of the class. He wipes up any grease or oil spilled on the floor. Until you take chemistry or physics, you are unlikely to have to use matches or fire in the shops. Should you need to, be careful. Put matches out, then place them in a metal container or some other place where they could not possibly start a fire even if they were lighted.

Any cuts or scratches should be given first aid at once.

In cooking class the rules of knowing how to do a thing and doing it well prevent accidents. You should know already how to avoid burns, scalds, cuts, and falls in home kitchens. How many of the ways of avoiding these accidents can you give without looking them up?

The difference between cooking at home and cooking at school is chiefly that there are many more people in the kitchen at school. You must watch to avoid bumping into other people. Be sure not to leave anything where it might cause them trouble. You know that you ought to wipe up spilled grease, for example, the minute it gets on the floor. So that no one will slip in the grease, get a damp cloth and remove it immediately. At school sev-

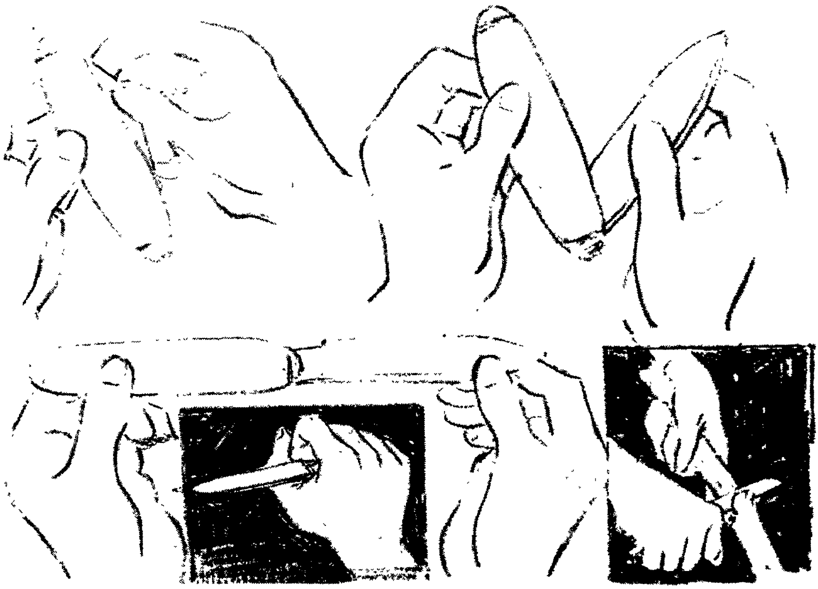
eral people may be working near the same stove. It is easy to crowd against a handle left sticking out in the way. Home accidents are usually the result of something you yourself have done or not done. In school kitchens or any place where there are a number of people working together, it is wise to make sure someone else's mistake or carelessness cannot hurt you. Of course you want to make sure that you cause no injury to anyone else.

Your teacher will tell you how to use all the kitchen tools. Pay attention, for you may think you know how to use them and yet not know. Getting a meal looks easy when your mother is doing it. You can learn some of the safety tricks from watching her and even more from helping. The school kitchen may have tools you do not have at home or have not used all by yourself. Keep your mind on your work. Talking and whispering take your attention and the attention of others from the work.

In sewing class put pins and needles where they will not stick into your fingers. Close your scissors every time you lay them down and place them in plain sight. Learn how to run the sewing machine. Remember to keep your fingers out from under the machine needle.

Except for the gymnasiums, with the locker and shower rooms, and playing fields, these safety suggestions should carry you through any ordinary day in school. There is one other danger yet to be considered. Have you wondered why so little has been said about fire?

Fire in school buildings is so dangerous that most schools, or at least the outside walls, are made of materials that do not burn easily. Brick, concrete, or stone is often used. Inside some of the safer buildings there is very little wood. Inside many others there are floors, doors,



and stairways that would burn readily. In such schools everyone must be extremely careful of fire.

Any place in which fire is more likely to start should have special protection. This means that furnace and boiler rooms, kitchens, and some shops and laboratories should be built with no wood or with some extra ways of stopping any fires. The hall doors of such rooms are often of some materials that do not burn. Fire extinguishers are kept in the rooms where they can be reached quickly. There may be fire extinguishers and long hoses in the halls of your school. Outside doors open outward. Often there is a bar across them so that people crowding to get out could not be caught back of a closed door.

The caretaker will empty wastebaskets and clear out papers and rubbish in which fire might start, just as you should do in your home. You can help him by putting

all papers in the wastebasket when you are through with them and by keeping the shops and other rooms clean and neat. In the kitchens or any other place where you use fire you should be sure to put out matches and to do nothing that might cause a flame to spread.

Fire escapes give you a way to get out of the building in case it should start to burn. Your fire escapes may be stairways of metal slats outside the building, or there may be two or more stairways inside made of materials that do not burn. There should be enough fire escapes in different parts of the building for everyone to be able to leave it quickly. If there is a fire at one end of the hall, for example, there should be a fire escape at the other end of the building. Nothing should ever be placed in front of fire-escape doors or on the stairways to prevent you from getting out easily. Stairways need to be light at all times, but in case of fire it is especially important to be able to see your way out.

Fire drills are held to show you how to get out of the school building quickly and safely. Although there are few school fires nowadays, pupils are taught safety habits that will save their lives should fire start. They learn exactly what to do and where to go as soon as the alarm sounds. Knowing what to do keeps the pupils from being frightened or from having to look around for a way out of the building.

Fire drills should be carried out just as if there were real danger. A fire drill is really simple when everyone does his part. For a good drill you should take your place in line as soon as you hear the alarm. The teacher directs the line. In some schools the safety patrol or pupils chosen and specially trained help at the time of the drill.

The lines move to certain exits. You have been told where to go from different parts of the building. Follow instructions exactly. In a good drill no one pushes, crowds, or runs. Usually no whispering or talking is permitted. You keep your attention on what you are doing. You should stay in line outside the building until the return signal is given. Be as orderly and quiet in going back as you were in going out. A drill carried out in the way suggested here forms good habits.

In case of a real fire it is more important than ever to follow safety habits and to stay in line. Do not lose your head. Unfortunately, if one person becomes frightened, others are likely to be frightened, too. Then almost anything can happen unless you keep to the safety habits that have been taught for emergencies. Play fair to yourself and to your classmates. Follow safety rules.

Should you discover a fire, do not try to put it out yourself even if you think you know how to use an extinguisher. Tell the nearest teacher or other grownup. Of course you would not scream or run, for that would frighten other pupils and would waste valuable time in reporting the fire. The sooner the fire is reported, the sooner the firemen can put out the blaze. The sooner, also, the alarm can be sounded and everyone have a chance to get out of danger. When you are once outside the building, stay in line and keep quiet. The teachers will need to check to see that all pupils are safe. If pupils are running around, they cannot be checked and they will be in the firemen's way.

The causes of accidents point the way to their prevention. Read over the causes mentioned on pages 239-240. Plan some way in which you can avoid every one of

these causes of accidents. You can also teach safety to younger children in school and at home.

Perhaps you are a member of the Junior Safety Council in your school and wear the button, badge, arm band, or belt that is the mark of the Safety Patrol. The safety patrols stand on the curb to guard dangerous street crossings. They give stop and go signals to pupils crossing the street. They teach younger children to practice safety in crossing the street and in playing. They make safety seem a desirable and wonderful thing to all the children. They are courteous and helpful at all times. It is an honor to be chosen to act on the Safety Patrol.

The patrols have fun, too. At their club meetings they often have motion pictures, shadow pictures, or slides showing "how to build and put out a campfire," "what to do when you see a wire dangling," and other safety activities. Sometimes firemen, policemen, doctors, and nurses tell them about safety and first aid. In the meetings in some schools the safety patrols practice giving first aid.

Things to Do

1. If you are a Scout, read what your Scout book says about safety and first aid. Dramatize for your class some of the safety activities described.

2. Read any books and magazines about safety that you can find in the library or that your teacher may have. The National Safety Council and American Red Cross have magazines and pamphlets you will enjoy reading.

3. Make and carry out a plan for preventing accidents in school, on the way to school, and at home. Have committees to work on different parts of this plan and join one of them. The teachers of special subjects may

help you write and give an exciting play on safety in their shop or laboratory.

Problems to Solve

1. If you, or someone you know, keeps having accidents, try to figure out the causes. It will be well to check on questions like these:

Do I see well?

Do I hear well?

Do accidents happen when I am angry or in a "don't care" mood?

Do I plan my time so I don't have to rush and hurry?

Do I look where I'm going?

Do I use tools correctly and put things back in place as soon as I've finished using them?

Do I know the rules of the games I play and follow them?

What kind of person am I? The person who is ready to help others, likes people and gets along well with them, generally thinks before he acts, is willing to obey reasonable rules and laws—this person has few or no accidents.

2. How do good manners help prevent accidents? Think of all the ways in which good manners would prevent accidents. For example, taking your turn getting a drink, instead of pushing ahead of others, would prevent accidents at the fountain. Sitting up instead of sprawling would prevent others from falling over your feet.

Discussion Questions

If you were marking Theodore's sentences, what score would you give him? If you think a sentence is wrong, explain in what way it is wrong and give the correct fact.

1. The loss of money is the only waste caused by accidents.

2. To know the general causes of accidents is not enough to prevent them.

3. Thinking about safety keeps you from playing wholeheartedly.

4. When you are worried, you should stop doing anything that might be dangerous.

5. Practice gives skill and control of muscles.

6. People who stand in your way in halls or on stairways should be pushed out of the way to teach them a lesson.

7. You should hurry in the school cafeteria so that you will have extra time to play after lunch.

8. When you are in the school shops and kitchens, you should pay close attention to what you are doing.

9. Fire drills should be orderly and should be carried out quietly and promptly.

10. Members of the Safety Council and school Safety Patrol are the only ones who need to do anything to make your school safer.

11. Taking dangerous dares proves that you are grown up and very brave.

SAFETY AT PLAY AND ON HIGHWAYS

GYMNASIUMS AND PLAYGROUNDS

Some studies of accidents among boys and girls of your age show that almost half the total number of injuries occur during play. Why should there be so many accidents in gymnasiums and on playgrounds? Why do you need to be careful when you are having fun in the gymnasium or on the playground, as well as in the school building or at home?

There are a number of reasons why playing may be

dangerous. Boys and girls become so interested in the game that they forget to be careful. They do not look where they are going. They stumble. They run into things or other people. Did you ever bump into a tree, a swing, or the corner of the house?

The places in which children play may be unsafe. The ground may be uneven, or there may be rubbish and rocks, bottles, boards, nails, and other things scattered about.

Sometimes children are rough and fail to follow the rules of the game. Or they may not be so familiar with the bars, horses, and other equipment as they will be later. They are only beginning to play more grown-up games. They may need to practice until they can control their muscles more skillfully.

Let us first discuss safety in the gymnasium. Certain care is taken there to make you safe, but you must do some things for yourself. One out of every three accidents in school buildings during a recent year occurred in the gymnasium.

The same safety rules apply to the lockers in the gymnasium as to lockers for your coats and hats. At the gymnasium lockers it is even more important to avoid pushing or rushing. The floor is often slippery, especially around the showers. Wet towels, stray cakes of soap, or clothing on the floor will make a person who is not watching his step trip and fall. Always use your own towel.

In some schools there is trouble with *athlete's foot.** Athlete's foot is a kind of *ringworm* * infection caused by tiny plants that grow in damp places. One of the common signs of ringworm is cracking between the toes. Small blisters form. The toes itch. Ringworm may also affect the bottoms of the feet, the armpits, or other parts

of the body. The *spores* * of the plants live a long time on damp floors, in shoes and stockings, and in wet towels. Ringworm is a common condition. The name *athlete's foot* probably comes from the fact that gymnasium dressing rooms are often a place for the ringworm spores to live. One person who is careless can scatter enough spores to pass the infection on to a good many other people.

The best way to avoid ringworm is to keep your feet from touching any place where the spores might be. Wear bathing slippers in the locker and shower rooms instead of running around barefoot. Dry your feet thoroughly, using your own clean towel. Give special attention to drying the skin between the toes. Some people rub their feet and toes with powder to absorb perspiration. There is usually someone to look at swimmers' feet before swimmers are allowed in the pool.

Should you have athlete's foot, ask your school doctor or school nurse what to do to clear it up. There are many advertised cures that do little good.

Before you can go into the school pool or join the regular gymnasium class or play on teams, you are given a physical examination. This protects you in two ways. Anyone with an infectious disease is not allowed to use the pool. In some cases, as in case of athlete's foot, he is not allowed to use any part of the gymnasium where the disease might be spread. Another reason for the examination is to make sure that you have no physical defect that would make it unwise for you to take strenuous exercise. Some people's hearts are not in condition for much exercise. Overstrain in the growing years is very harmful.

After you have passed your physical examination, you are asked to provide yourself with gymnasium shoes.

Rubber soles grip the slippery floor and help prevent falls. Usually you have a special gymnasium suit, which allows you to move freely and saves wear on your school clothes. You look and feel much fresher in class after gymnasium if you wear other clothes for exercise and sports. Football and hockey players wear pads, guards, and helmets to take the force of falls and blows.

The short time before class is called to order to begin gymnasium work is sometimes dangerous, because boys and girls run, slide, push into one another, or try stunts on the *apparatus.** You can have fun without practical jokes or roughhouse. Some of the apparatus may carelessly be left hanging where you could bump your head. The heavy standards and braces of other apparatus are spread along the floor and may trip you until you learn to look out for them. You need practice to learn how to use apparatus. Strength and skill also come with practice. If your teacher has told you to use a mat for certain work, do not think you are clever to try stunts without the protection of a mat, properly placed. Showing off is silly. During games or warming up before class, keep out of the way of the balls others are using. Any direct hit is painful. If you cannot see well without glasses, ask your teacher what to do about wearing them or play games in which there is no danger that your glasses will get broken.

Your teacher or coach explains the way to use the apparatus. He helps you play games skillfully and safely. He or someone working with him sees that the gymnasium and equipment are in good condition. He has the pool checked to be sure the water is safe for swimming. Out on the field he sees that the ground and track are made level, free of anything that might cause falls, and

generally in safe condition for use. He and others in the school make sure that the places where you play and exercise are safe. They make sure that you are physically fit. In class your coach teaches the rules of the game. Your part is to be alert and skillful. (See page 264.)

Your swimming teacher watches closely to see that you are getting along well. He does not let you try the deep end of the pool or diving until you are skilled enough. Ducking, joking, or false-alarm calls for help are dangerous. When you dive, be sure the water is deep enough. Dive only where diving is permitted and look to be sure that no one is swimming below the diving platform. Swimmers should keep out of the way of divers.

Good form in gymnasiums, in pools, and on playing fields aids safety and makes you a better athlete.

Good sportsmanship means following the rules of the game, being considerate of other people, and doing nothing that might injure them. Boys and girls of your age can set young children a good-sportsmanship example.

School playgrounds and public playgrounds usually receive daily attention, but the people using them must look out for rocks, fruit peel, broken glass, or rubbish that may later be dropped. There may be someone to teach you to play games and oversee the grounds part of the time. Often there is no one. Then you should take responsibility for playing safely and avoiding accidents even more than when you have a teacher. In parks and public play-places there is no physical examination. You have to decide for yourself whether or not you can safely play strenuous games. Learn to stop before you become overtired. You should follow the rules and avoid rough play. Some boys have their own masks and mitts or foot-

ball suits. Football without proper training and padding is a dangerous game.

The following safety suggestions for baseball or softball will help you in school games. The list also gives some good rules for other playground or neighborhood games. Baseball is given as the cause of a large number of injuries to boys and girls of your age.

1. Practice correct baseball rules at all times.
2. Select a large enough area, not near buildings.
3. Do not play in a street that is not blocked off for play, and do not run into the street to chase balls.
4. Remove all the things that might cause falls.
5. Stay on the right side of the batter when in.
6. Do not sling the bat.
7. Control the throwing of the ball.
8. Be careful not to run into the basemen.
9. Use caution in sliding for bases.
10. Keep your eye on the ball at all times.
11. Keep out of your teammate's territory in fielding flies.
12. Use sandbags instead of rocks for bases.
13. Hold your bat correctly.
14. Avoid throwing balls too hard to be caught.
15. Control your temper at all times.
16. Do not play when you are injured in any way.
17. Treat all cuts and scratches, even small ones.
18. Call the doctor for serious sprains, broken bones, and other severe injuries.

Notice how many of these safety rules good players and good sportsmen follow as a matter of good form.

At a playground or in a park the people who are not playing in a certain game should keep out of the way of

players. When the grounds are very crowded, you need to be more careful than ever.

The speed limit for automobiles driving through parks is sometimes not strictly enforced. The safer play-places are those back from automobile drives. These may be fenced so that no one can forget and run out in the path of automobiles. In some parks tunnels under the drive or bridges over it provide safe ways to cross.

Whenever a public swimming pool or beach is officially open, there is almost always a guard on duty. Along lakes and rivers there may be guards at certain parks. But on a hot day the water is full of swimmers. Any crowding or practical joking may injure others.

Old quarries are particularly dangerous swimming places. The water is often deep. Divers may strike their heads on rock. You should never dive until you are sure the water is deep enough and that there are no stones or logs where you are apt to hit them. You may think a lake or river is shallow enough for you to walk in, but you may suddenly step off into a deep hole or be caught in a swift current. A danger to health is swimming too close to a sewer outlet or in water with harmful bacteria in it.

Playing in vacant lots has all the dangers of public playgrounds plus those of rough ground and rubbish. If the owner of the lot agrees to let you use it, it will not take long for all the boys and girls in the neighborhood to clean it up and make it safe. Perhaps a father or big brother will help plan what needs to be done. No street, even a street on which there are usually few automobiles or wagons, is a safe play-place unless it is closed to traffic. In some cities certain streets are reserved for coasting or for summer play-places by the police department. A big

IS THE COAL WORTH THE RISK?

sign is put up, and a barrier of some kind is placed at each end of the play section.

Playing around railroad tracks or in switch yards has cost many lives and caused many serious injuries. In the first place, the tracks and yards are private property. Children running to get away from railroad guards may catch their feet in the ties and rails or they may fall. Cinders ground into the skin are very painful and may carry bacteria into the skin. Hopping on freight cars is another dangerous thing to do. The car may pick up speed. To get off, a person must risk a fall. He may be killed or crippled if he rolls under the wheels. Walking

or playing along the tracks, even when you do not think a train is due, is unsafe, because a special train may come along unexpectedly. It is never safe to cross a railroad bridge or trestle, even a short one, for the same reason.

BICYCLES

It is great fun to ride a bicycle. If you have been wanting one, you may have told your father and mother how much exercise you would have and how a bicycle would keep you out in the sun and air. Perhaps you have told your mother that you would run all her errands in no time at all. Perhaps you have told your father that you would help earn the money to pay for it.

Your parents may say that a bicycle is too dangerous. They may remind you of an accident some boy or girl you know had while riding. A bicycle is dangerous, just as an automobile is dangerous, to the person who does not follow safety rules. The number of deaths due to bicycles and motor vehicles running into one another doubled in a recent five-year period. Each year many boys and girls are hurt in bicycle accidents of other kinds. It is no wonder your parents fear you will be injured if they allow you to ride. Great care is necessary. Wise bicycle riders and good drivers follow safety rules.

The distance from the seat to the pedals of the bicycle should be adjusted to make you comfortable and give you good control of your wheel. Brakes must be in good condition. If you ride after it is beginning to get dark, it is safer to wear something white or to tie a white handkerchief on your left arm, as Boy Scouts do when they walk along country roads at night. Keep the mud or dust wiped off your taillight. Red reflector buttons help

motorists see you ahead on the road. Keep your handle bars free for steering.

Many accidents happen to beginners while they are learning new skills. Beginning cyclists are wise to learn on a dirt path where no automobiles will run over them. Avoid streets with heavy traffic at all times, but certainly until you ride well. Keep your mind on your riding and your wheel under control. Give hand signals as automobile drivers do, if that is the law where you live. Like them, obey traffic lights and policemen. Watch for pedestrians.

Learning to be a safe rider helps you form habits that will make it easier for you to be a safe driver when you are a little older and may drive the family car. Here is another good idea borrowed from wise drivers. Keep your hands on the handle bars and your feet on the pedals. Then your wheel will be under control. You can avoid accidents when things suddenly get in your way. Look out for ruts and holes in the roads. Do not try to ride fast over rough ground. Avoid catching your tires in streetcar tracks.

In most places bicycles are not allowed on sidewalks. Where they are, be careful not to ride too close to people who are walking. It is not good manners to frighten people. They may not see you until you are almost up to them. Then they may become frightened and step in your way, and you or they may easily be hurt and your wheel may be wrecked.

In the street you should ride in the same direction as automobiles go. This means that you cannot see what is coming behind you. Stay near the curb to be out of part of the traffic. Look ahead to see if traffic lights are about to change. Cars stop quickly. You may be caught among

them, run into, or squeezed between two cars. It is usually possible to find a street where there is less traffic. You will have more fun riding when you do not have to keep all your attention on automobiles and trucks that are all about you.

Hitching rides is one of the most dangerous things you can do. You know that you should not hitch rides when you are coasting or roller skating. You have less control of your bicycle when you hold with one hand to a car or truck. In case the driver stops suddenly or turns, you may fall. You may roll under the wheels of the car. The car to which you are holding may start to go very fast. If you let go, you may fall or may go into the path of other automobiles. If you hang on, you are in danger. Under any circumstances hitching is an extremely foolish and dangerous thing to do.

You know the old song about the bicycle built for two. Back in your grandfather's day some bicycles were built for two riders. Your bicycle is not. There is no place for passengers. When you carry small children on the handle bars or bigger ones on the crossbar, you cannot steer well and you cannot see the road ahead very well. Small children are likely to move around and upset you.

Did you know that it is not wise to ride just after a meal? Or did you think that rule applied only to swimming? Strenuous exercise too soon before or after a meal hinders digestion. Avoid long rides in the hot sun. Start with shorter rides and work up to longer ones if you want to prevent soreness and overfatigue. Fatigue makes you more likely to have accidents of all sorts. When you plan a long ride, do as hikers do. Remember that you have to come home. Allow time and energy for the return trip.

You can help your family by using your bicycle to run errands. Baskets or packages balanced on the handle bars will keep you from having control of your steering. You should get a package carrier or make strips of leather or heavy cloth to fasten packages out of your way. Books on hobbies and camping tell how to make these strips.

BOATS

If you live near the water, boating is a good sport. Many of you spend part of your vacation near water. Those who go to camp know now these safety rules:

1. Do not try to take out a canoe or rowboat or to ride in one until you know how to swim.
2. Only those who know how to handle a boat well enough to bring it to shore safely if the water becomes rough should try to take out a boat alone or with passengers who cannot manage the boat.
3. Never go out in stormy weather or when bad weather seems to be coming.
4. Be careful about moving around in rowboats. Never shift places in a canoe. A canoe tips over easily.
5. Do not overload the boat.
6. Pull a person into the end of a canoe or rowboat, not over the side.

Learning how to handle a canoe or small boat takes practice. Sailboats require skill in handling and the ability to tell about winds and currents. Unless you have a great deal of experience and skill, you should not try to go out alone in a boat, especially in water with which you are unfamiliar.

To rock a canoe or other small boat is dangerous, even to good swimmers. At camp you may have a chance to

be in a canoe tilt. Only good swimmers are permitted to play this game. The swimming teacher is near. It is not played in deep water. There are people ready to aid anyone who needs help. Rocking or tipping a boat at any other time or place is extremely dangerous. The person who amuses himself doing dangerous tricks in a small boat should be taken to shore at once.

STREETCARS AND BUSES

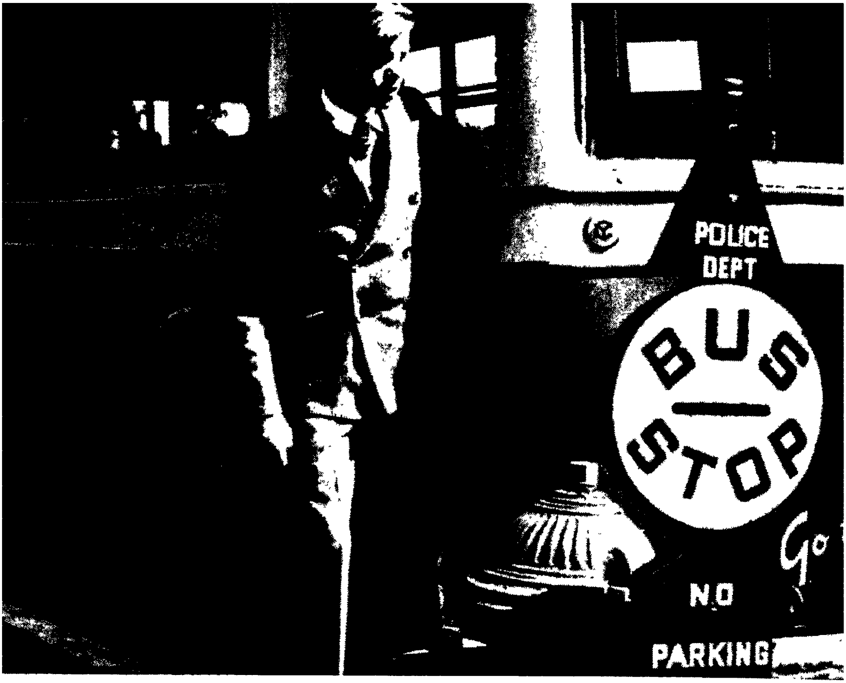
You may have to ride to school. In a number of cities the children in the lower grades have schools within walking distance, but the upper-grade pupils often have to go to buildings farther away. In many of the country sections buses bring all pupils in to a central school.

Walking is good exercise. Unless you have too far to go, plan to get up early enough to eat a good breakfast and walk to school. Some boys and girls who live at a distance walk one way and ride the other.

Wait on the sidewalk for streetcars or buses in case there is no *safety zone.** Some people prefer to wait on the walk even where there is a zone. Whichever you do, be sure not to step in the way of automobiles when you go to the center of the street. In safety zones it is wise to stand facing traffic. Then if an automobile is coming too close, you can step out of the way.

On the car you may be jerked from side to side as the car goes over rough tracks rapidly. Hold the back of a seat or catch a strap until you find a seat. If you have to stand, brace your feet solidly and hold a strap, seat, or pole. Packages or suitcases should be kept out of the aisle. An umbrella in the aisle may trip someone.

The boy in the picture on page 272 is getting off a bus



the safe way. He faces forward so that a sudden jerk will not make him stumble or fall. His left hand is free to hold on if he needs to. He waits until the bus has come to a full stop. If he stepped off while the bus was moving, he might be thrown forward. The bus might be going faster than he realized. Automobile drivers do not expect anyone to get off a car or bus until it stops. They might run over him if he hopped off sooner.

After you get off the bus or car, look to be sure that no traffic is coming. When the way is clear, go to the side-walk. If you are not on the crosswalk—but in the safety zone—go along the zone to the crosswalk before you start to the curb. When you want to go to the opposite side of the street, go to the crosswalk and wait for the traffic light or policeman's signal.

The person who crosses behind a car or bus cannot see what is coming. Drivers from the opposite direction cannot see him. Crossing directly in front of the car or bus from which you have just stepped is unsafe unless the traffic signal gives you the right to cross. Some careless people think that they will have time to dash across before the car starts. The driver or motorman might not at first see them and might start. He would have to put on his brakes suddenly. Something behind his vehicle might run into him, or he might not be able to stop soon enough to avoid hitting a person ahead.

On school buses it is important not to move about while the bus is in motion. Sometimes the driver is so bothered by pupils' behavior that he cannot pay strict attention to his driving. Then there is danger for everybody. Certain boys and girls may be chosen to act as safety patrols. They see that pupils get on and off the bus safely and that they act well during the ride. Pupils who ride on school buses should follow the same safety rules about watching traffic before they get on the bus and after they leave it as have been given for streetcars and public buses. The difference is that in the country there will not be safety zones nor many traffic signals.

Things to Do

1. What safety rules should you follow when you go swimming and boating? When you are riding a bicycle? When you are roller skating? When you are making and leaving a campfire? When you are walking along a country road? When you are playing baseball? When you are with animals? When you are riding horseback or driving a horse? When you are using rings, swings,

and other apparatus on the playground? When you have been using tools at farm work? When there are small rugs on the floor, a hole in the carpet, or a broken step on the porch? When you are climbing trees? When you are working around boiling water or other hot liquids? When you are using matches? When you are setting off fireworks? When you are using gasoline or kerosene? When you are using electricity? When you are working or playing in places where poison ivy grows?

If no one in the class knows the best thing to do in any of these situations, look it up in a Scout book, in safety books, in safety magazines, or in booklets to be obtained from the National Safety Council.

Problems to Solve

1. *How to decrease accidents in your group.* A good way to begin is for each person to keep a record for a month of any accidents that happen to him or her. Tell:

Time and date	The place	Kind of accident	Causes
8:30 a.m. May 1	On the hill near the school	Fell over a rock when running	Was afraid I would be late for school—didn't look ahead.

After having found the causes of the accidents in the group, you can think of ways to prevent these. Try them out. Were there fewer accidents during the second month?

2. *How to have safe places to play.* You might begin work on this problem by exploring your community. Get or draw a map of the community. Mark on it the best and safest places to play. Plan other safe play places for young children, for boys and girls of your age, and for grown-ups. Carry out your plan.

3. *How to improve riding on the school bus.* Some children riding on the school bus shout and push and tease one another. This disturbs the driver and often leads to accidents. How can you help solve this problem? How can you interest the children in making the bus ride safe?

Discussion Questions

Do you agree with all that Adelaide says about safety? Discuss what she has written.

1. Few accidents occur on the school playgrounds or in the gymnasium.
2. A good athlete does not have to think about safety.
3. When you play in a park or at a beach, you should avoid running into other people.
4. You should not play outdoors if the only place you have to play is a vacant lot or the street.
5. It is safe to hitch rides and to carry someone on the handle bars of your bicycle if you are careful.
6. You should know how to swim and how to handle a boat before you take one on the water.
7. When a bus is coming, hurry out to it, because, if you miss the bus, you will be late for school.
8. Bicycle riders should follow traffic rules.
9. Watch traffic when you get off a streetcar or bus.
10. It is as important to protect yourself from accidents as it is to protect yourself from bacteria.

Interesting Books

Carpenter and Wood—*Our Environment: Its Relation to Us*, pp. 166-177, 212-214
Evans—*Everyday Safety*
Floherty—*Watch Your Step*
Leaf—*Safety Can Be Fun*

WHAT HARM IS THERE IN ALCOHOLIC DRINKS?

Donald had just seen a play on television. It was called "The Lost Week End." It was about a man who wanted to have a good and happy life, but alcohol made it impossible. It was a very sad story.

"Does alcohol do that to people?" Donald asked his father.

"Yes," his father said, "alcohol does that to some people. They cannot take alcoholic drinks without becoming slaves to it. There are between three and four million of these people in our country. They are called *alcoholics*. They cause misery to themselves and to their families."

"Like the man in the play," said Donald.

"Yes, and it's hard to tell whether you may become an alcoholic. So it's much better to 'play safe,' and not start something that might become a bad habit. About 70 per cent of alcoholics started drinking as teen-agers.

"Alcoholics also cost us all a great deal of money. In one state alone, in a single year, the citizens paid out $107,474,953 to take care of the crimes, disease, and poverty caused in large part by alcohol.

"In New York City, alcoholics add $13,000,000 a year to the city's bill for families on relief."

Although there are some differences of opinion about the effects of alcoholic beverages such as beer, wine, and whiskey, doctors and scientists agree that the use of alcoholic beverages has these harmful effects:

Alcoholic drinks, such as beer, wine, and whiskey are habit forming.

Experiments made by doctors show that strong alcoholic drinks, taken often, irritate the stomach.

People who drink cannot resist disease as well as those who do not drink. This is because alcohol weakens the white blood cells which fight germs.

Drinking alcoholic beverages or overeating makes airplane pilots less able to fly very high.

Alcohol also makes it harder to stand the cold. A person who has been drinking may feel warmer, but his body temperature is really lower than usual.

Drivers who have been drinking have more automobile accidents than those who do not drink. They are often 10 per cent slower than those who do not take alcoholic drinks, but they think they can react just as quickly. These drivers kill or injure others as well as themselves. And people who have been drinking are hit by cars more often than are non-drinkers.

People who have been drinking often do things they regret.

Some people drink to forget their troubles and problems. This does not help in the long run. Instead of trying to avoid their problems, they should face them and try to solve them alone or with help. "Running away" usually gets them into more serious trouble.

The cause of the disease of alcoholism is *alcohol*. The only cure for alcoholism is to give up drinking altogether. As long as a person lets alcohol alone, he is safe.

Abraham Lincoln once said, "Alcohol has many defenders but no defense." What do you think he meant by that?

A well-known doctor, Dr. Haven Emerson said, "You don't need alcohol for health, you don't need it for strength, you don't need it for food, you don't need it for drink; it never does you any good." And a world-famous runner, Gil Dodds, asked, when he heard that, "Then why drink?" What is your answer?

WHAT HARM IS THERE IN SMOKING?

Many people smoke. Smoking is very common nowadays. When asked why she *did not* smoke, one college girl said, "Oh, smoking is old-fashioned!"

If adults are healthy, smoking three or four cigarettes a day seems to be fairly harmless. But all doctors agree on two things: (1) that people with heart trouble, or throat or lung trouble, or certain other diseases should not smoke, and (2) that growing boys and girls should not smoke.

Here are some reasons why smoking is harmful to growing boys and girls, and to many adults too:

Smoking leaves a bad taste in the mouth. This often takes away a person's appetite; he does not eat as much food as his growing cells need.

Smoking may also lead to buying more soft drinks; these take away the appetite for regular meals and are also a cause of tooth decay.

Tobacco makes a yellow stain on the teeth and fingers and causes an unpleasant "tobacco breath."

Smokers have more colds than those who do not smoke, and their colds "hang on" longer.

The nicotine in tobacco makes the heart beat faster. Since the only time the heart rests is between beats, smoking gives the heart less time to rest. This would, of course,

be harmful to people with heart trouble. Even many athletes do not smoke because they need strong hearts that will stand the strain of fast running and hard playing.

Smoking often makes people restless; they do not sleep so well as they should. And you know how important sleep is.

Boys who smoke do not, in general, do as well in school as boys who do not smoke. This may be because the nicotine in tobacco may make it harder for them to learn and to remember.

Smoking may irritate the lining of the mouth and throat. This may lead to bronchitis, sinus trouble, or cancer of the mouth or lungs.

Abraham Lincoln might have said, "Smoking has many defenders but no defense." What do you think about this?

WHAT HARM IS THERE IN OTHER DRUGS?

Everyone agrees that habit-forming drugs are very harmful to health, mind, and morals. Then why are there so many drug addicts — people who have become slaves to these drugs, who cannot free themselves from them?

Once a person becomes a drug addict he suffers so terribly when he does not have the drug that he will pay anything to get it. Criminals who push the sale of habit-forming drugs know this. These "pushers" try to get boys and girls to become drug addicts so that there will be more people to buy the drugs. In this way the pushers make a lot of money.

But why does anyone ever take any of these habit-forming drugs in the first place? A few boys and girls want to be daring; they are afraid of being called "chicken" or

a poor sport. Other people take drugs when they are unhappy; they want to run away from their troubles and problems, never thinking that they are running into much greater trouble. Some people began taking drugs to ease pain. Before they knew what was happening, they had formed the drug habit.

Safety lies in saying "No." There should never be a first time for taking habit-forming drugs.

Is the drug habit a serious problem? What makes you think so? See how many newspaper clippings you can find about habit-forming drugs. Note anything you hear over the radio or see on TV about them. What decision should your whole class make now about the use of habit-forming drugs?

APPENDIX: WEIGHT IN RELATION TO AGE, HEIGHT, AND TYPE

(Based upon the tables of BIRD T. BALDWIN, PH.D.)

INSTRUCTIONS FOR USE OF CHART

1. Before the pupil is measured, it should be determined by careful observation to which physical type he belongs. In case of doubt it may be helpful to note that the Nordic races (central and northwestern Europe) are usually of the tall, slender type; the southern European or Mediterranean races are usually of the short, stocky type.

2. The pupil's height in inches should be taken against the scale of the type to which he belongs. A right-angled triangle or square placed against the wall and on top of the pupil's head should be used to secure accuracy.

3. The following illustrations will serve to interpret the scale:

A 14-year-old boy of the tall slender type, 67 inches tall. He is of normal weight if he weighs 128 pounds; he would be considered underweight if he weighed under 115 pounds and overweight if he weighed over 153 pounds.

A 15-year-old girl of the average type, 63 inches tall. She is of normal weight if she weighs 116 pounds; she would be considered underweight if she weighed under 104 pounds and overweight if she weighed over 139 pounds.

(Courtesy Board of Education, Division of Physical and Health Education, The Board of Public Education, Philadelphia, Pa.)

TALL, SLENDER TYPE									AVERAGE TYPE									SHORT, STOCKY TYPE								
BOYS					GIRLS				BOYS					GIRLS				BOYS					GIRLS			
WEIGHT (LB.)						WEIGHT (LB.)			WEIGHT (LB.)						WEIGHT (LB.)			WEIGHT (LB.)						WEIGHT (LB.)		
Under (Underweight)	Over (Overweight)	Normal Weight	Age (Years)	Height (Inches)	Age (Years)	Normal Weight	Over (Overweight)	Under (Underweight)	Under (Underweight)	Over (Overweight)	Normal Weight	Age (Years)	Height (Inches)	Age (Years)	Normal Weight	Over (Overweight)	Under (Underweight)	Under (Underweight)	Over (Overweight)	Normal Weight	Age (Years)	Height (Inches)	Age (Years)	Normal Weight	Over (Overweight)	Under (Underweight)
147 142 140 140 138	195 189 187 187 183	163 158 156 155 153	19 18 17 16 15	72									72									72				
137 136 135	182 181 180	152 151 150	17 16 15	71					143 139	191 185	159 154	19 18	71									71				
133 130 130 129	177 174 173 172	148 145 144 143	17 16 15 14	70					140 135	187 180	155 150	19 18	70									70				
125 125	167 167	139 139	15 14	69	18 17 16	142 140 138	170 168 166	128 126 124	137 134 131 129	182 179 175 172	152 149 146 143	19 18 17 16	69									69				
121 121	161 161	134 134	15 14	68	18 17 16 15 14	138 138 136 135 133	166 166 163 162 160	124 124 122 121 120	132 129 127 123	176 172 169 164	147 143 141 137	19 18 17 16	68									68				

TALL, SLENDER TYPE

Boys Weight (Lb.) Underweight (Under)	Boys Weight (Lb.) Overweight (Over)	Boys Normal Weight	Boys Age (Years)	Height (Inches)	Girls Age (Years)	Girls Normal Weight	Girls Weight (Lb.) Overweight (Over)	Girls Weight (Lb.) Underweight (Under)
115	153	128	14	67	18 17 16 15 14	135 133 133 131 130	162 160 160 157 156	121 120 120 118 117
110 107 107	146 143 143	122 119 119	14 13 12	66	18 17 16 15 14 13	130 129 128 125 124 124	156 155 153 150 149 149	117 116 115 112 112 112
105	140	117	13	65	15 14 13	122 121 120	146 145 144	110 109 108
100 98	133 131	111 109	13 12	64	13 12	115 114	138 137	103 103
96 95	128 127	107 106	13 12	63	13 12	110 110	132 132	99 99
91	121	101	12	62	12	105	126	94
86 85	115 114	96 95	12 11	61	12 11	100 99	120 119	90 89
83 83	110 110	92 92	12 11	60	12 11	95 95	114 114	85 85
79 78	106 104	88 87	11 10	59	11 10	90 87	108 104	81 78

AVERAGE TYPE

Boys Weight (Lb.) Underweight (Under)	Boys Weight (Lb.) Overweight (Over)	Boys Normal Weight	Boys Age (Years)	Height (Inches)	Girls Age (Years)	Girls Normal Weight	Girls Weight (Lb.) Overweight (Over)	Girls Weight (Lb.) Underweight (Under)
122 121 117	163 161 156	136 134 130	17 16 15	67				
119 115 112	158 153 150	132 128 125	17 16 15	66				
110 108 106	146 144 142	122 120 118	16 15 14	65	18 17 16	126 125 123	151 150 148	113 112 111
103 102	138 136	115 113	15 14	64	18 17 16 15 14	123 122 120 119 117	148 146 144 143 140	111 110 108 107 105
99 97	132 130	110 108	15 14	63	18 17 16 15 14	120 119 117 116 112	144 143 140 139 134	108 107 105 104 101
93 92	123 122	103 102	14 13	62	15 14 13	113 109 108	136 131 127	102 98 95
89 87	119 116	99 97	14 13	61	14 13	105 101	126 121	94 91
84	112	93	13	60	13	97	116	87
80 80	107 107	89 89	13 12	59	13 12	92 90	110 108	83 81

SHORT, STOCKY TYPE

Boys Weight (Lb.) Underweight (Under)	Boys Weight (Lb.) Overweight (Over)	Boys Normal Weight	Boys Age (Years)	Height (Inches)	Girls Age (Years)	Girls Normal Weight	Girls Weight (Lb.) Overweight (Over)	Girls Weight (Lb.) Underweight (Under)
128 125	170 167	142 139	19 18	67				
125 122	167 163	139 136	19 18	66				
121 118 115	161 157 152	134 131 127	19 18 17	65				
117 113 109 105	156 151 145 140	130 126 121 117	19 18 17 16	64				
115 111 106 102	152 148 142 136	127 123 118 113	19 18 17 16	63				
100 96 94	133 128 125	111 107 104	17 16 15	62	18 17 16	118 117 115	142 140 138	106 105 103
93 90	123 120	103 100	16 15	61	18 17 16 15	116 113 112 108	139 136 134 130	104 102 101 97
86 85 85	115 114 113	96 95 94	16 15 14	60	18 17 16 15 14	111 109 108 105 101	133 131 130 126 121	100 98 97 94 91
81 81	108 108	90 90	15 14	59	16 15 14	103 100 96	123 120 115	93 90 86

TALL, SLENDER TYPE

Boys Weight (Lb.) Underweight (Under)	Boys Weight (Lb.) Overweight (Over)	Boys Weight (Lb.) Normal Weight	Boys Age (Years)	Height (Inches)	Girls Age (Years)	Girls Weight (Lb.) Normal Weight	Girls Weight (Lb.) Overweight (Over)	Girls Weight (Lb.) Underweight (Under)
76 76	101 101	84 84	11 10	58	11 10	86 84	103 101	77 76
72	96	80	10	57	10	82	98	74
69 68	92 91	77 76	10 9	56	10 9	78 76	94 91	70 68
65	86	72	9	55	9 8	74 72	89 86	67 65
63 63	84 84	70 70	9 8	54	9 8	70 69	84 83	63 62
60	80	67	8	53	8	67	80	60
58 57	77 76	64 63	8 7	52	8 7	64 63	77 76	58 57
55	73	61	7	51	7	59	71	53
52 51	70 68	58 57	7 6	50	7 6	56 56	67 67	50 50
49	66	55	6	49	7 6	54 54	65 65	49 49
47	62	52	6	48	6	52	62	47
44	59	49	5	47	6 5	50 49	60 59	45 44

AVERAGE TYPE

Boys Weight (Lb.) Underweight (Under)	Boys Weight (Lb.) Overweight (Over)	Boys Weight (Lb.) Normal Weight	Boys Age (Years)	Height (Inches)	Girls Age (Years)	Girls Weight (Lb.) Normal Weight	Girls Weight (Lb.) Overweight (Over)	Girls Weight (Lb.) Underweight (Under)
76	102	85	12	58	12	86	103	77
73 73	97 97	81 81	12 11	57	12 11	82 82	98 98	74 74
69 69	92 92	77 77	12 11	56	12 11	79 78	95 94	71 70
66 66	88 88	73 73	11 10	55	11 10	74 74	89 89	67 67
63	84	70	10	54	11 10	71 70	85 84	64 63
60 60	80 80	67 67	10 9	53	10 9	68 67	82 80	61 60
58	77	64	9	52	10 9	64 64	77 77	58 58
55 55	73 73	61 61	9 8	51	9 8	61 60	73 72	55 54
52	70	58	8	50	8	57	68	51
49 49	66 66	55 55	8 7	49	8	55	66	49
48	64	53	7	48	7	52	62	47
45 45	60 60	50 50	7 6	47	7	50	60	45

SHORT, STOCKY TYPE

Boys Weight (Lb.) Underweight (Under)	Boys Weight (Lb.) Overweight (Over)	Boys Weight (Lb.) Normal Weight	Boys Age (Years)	Height (Inches)	Girls Age (Years)	Girls Weight (Lb.) Normal Weight	Girls Weight (Lb.) Overweight (Over)	Girls Weight (Lb.) Underweight (Under)
78 77 76	103 103 102	87 86 85	15 14 13	58	15 14 13	96 93 88	115 112 106	86 84 79
75 74	100 98	83 82	14 13	57	14 13	88 84	106 101	79 76
70 70	94 94	78 78	14 13	56	14 13	83 81	100 97	75 73
67 67	89 89	74 74	13 12	55	13 12	77 75	92 90	69 67
64 64 63	85 85 84	71 71 70	13 12 11	54	13 12	73 71	88 85	66 64
61 60	82 80	68 67	12 11	53	12 11	69 68	83 82	62 61
58 58	77 77	64 64	11 10	52	12 11	67 65	80 78	60 58
55 55	73 73	61 61	11 10	51	12 11 10	65 63 61	78 76 73	58 57 55
52 52	70 70	58 58	10 9	50	11 10 9	61 59 58	73 71 70	55 53 52
49 49	66 66	55 55	10 9	49	10 9	56 55	67 66	50 49
48 48	64 64	53 53	9 8	48	10 9 8	55 52 52	64 62 62	48 47 47
45 45	60 60	50 50	9 8	47	9 8	50 50	60 60	45 45

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This glossary explains the less common words in this book. It includes each word in the text that has a star (*) after it. The page reference indicates the first use of the word.

KEY TO SOUNDS

ā *as in* āte	ĕ *as in* move′mĕnt	o͞o *as in* fo͞od
ā *as in* car′bon-āte	ē *as in* moth′ēr	o͝o *as in* fo͝ot
â *as in* câre	ī *as in* īce	ou *as in* out
ă *as in* ăm	ĭ *as in* ĭll	ū *as in* ūse
ă *as in* fi′năl	ō *as in* ōld	ū *as in* ū-nite′
ä *as in* ärm	ō *as in* ō-bey′	û *as in* bûrn
ȧ *as in* ȧsk	ô *as in* ôr′der	ŭ *as in* ŭp
ȧ *as in* so′fȧ	ŏ *as in* ŏdd	ŭ *as in* cir′cŭs
ē *as in* ēve	ŏ *as in* lŏss	th *as in* bathe
ē *as in* ē-vent′	ŏ *as in* cŏr-rect′	zh *like the* s *in* treas′ure
ĕ *as in* ĕnd	oi *as in* oil	

ABSORB (ăb-sôrb′). To swallow up; to soak up. (p. 73)

ADENOID (ăd′ē-noid). A group of cells forming a spongy growth or swelling that partly blocks the passage between the nose and the throat. Also called adenoid tissue. (p. 91)

ADOLESCENCE (ăd′ō-lĕs′ĕns). The growing from childhood to maturity; youth. (p. 23)

ALBUMIN (ăl-bū′mĭn). A kind of protein, as the white of egg. (p. 125)

ALCOHOL (ăl′kō-hŏl). A colorless liquid which is the part of beer, wine, and whisky that intoxicates. (p. 6)

ALCOHOLIC (ăl′kō-hŏl′ĭk). Of or pertaining to alcohol. (p. 6)

AMINO ACIDS (ăm′ĭn-ō.) One of the chemical elements of which proteins are built. (p. 58)

ANTIBIOTICS (ăn′tī-bī-ŏt′ĭks). Drugs which are used in the treatment of pneumonia. (p. 208)

ANTITOXIN (ăn′tĭ-tŏk′sĭn). A chemical substance made by the body which can change the poisons of bacteria so that they become harmless. (p. 204)

APPARATUS (ăp′ȧ-rā′tŭs). Equipment for doing certain things, as the bars, ladders, and rings in a gymnasium. (p. 261)

ARSENIC. (är′sē-nĭk). A very poisonous drug. (p. 75)

ASCORBIC (ăs-kôr′bĭk). *Ascorbic acid* is the chemical name for vitamin C. (p. 151)

ASTHMA (ăz′mȧ). A disease which causes coughing and difficulty in breathing. (p. 191)

ATHLETE'S FOOT (ăth′lēts). A skin disease that causes blisters and itching. It often occurs on the feet of those using gymnasiums. (p. 259)

ATHLETIC (ăth-lĕt′ĭk). Of or pertaining to athletes or their exercises and games. (p. 37)

AUREOMYCIN (aw′rē-ō-mī′sĭn). A drug which is used to cure some infections, such as typhoid fever. (p. 218)

BACILLUS (bȧ-sĭl′ŭs). Any rod-shaped bacterium. The plural is *bacilli*. (p. 188)

BACTERIA (băk-tēr′ĭ-ȧ). Microscopic living things belonging to the plant kingdom. The singular is *bacterium*. (p. 43)

BACTERIOLOGY (băk-tēr′ĭ-ŏl′ō-jĭ). The scientific study of bacteria. (p. 203)

BERIBERI (bĕr′ĭ-bĕr′ĭ). An acute disease of the nerves caused ture, and habits of plants and animals. (p. 66)

BLADDER. A strong, muscular bag, or sac, which holds the urine after it leaves the kidneys. (p. 74)

BRONCHIAL TUBES (brŏng′kĭ-ăl). The lower branches of the windpipe. (p. 207)

BRONCHITIS (brŏn-kī′tĭs). Inflammation of the mucous membrane of the bronchial tubes, or bronchi. (p. 211)

CAFETERIA (kăf′ē-tēr′ĭ-ȧ). An eating place where one serves himself. (p. 170)

CAFFEINE (kăf′ē-ĭn). A drug found in coffee, tea, and some other drinks. (p. 73)

CALCIUM (kăl′sĭ-ŭm). A soft, white metallic element found only in combination with other elements, as with oxygen. (p. 49)

CALORIE (kăl′ō-rĭ). A unit measure of the heat energy in food. (p. 87)

CANCER (kăn′sēr). A disease in which certain tissue cells grow in a wild and harmful way. (p. 187)

CARBOHYDRATE (kär′bō-hī′drāt). One of a class of carbon compounds found in protoplasm, starches, and sugars. (p. 87)

CARBON (kär′bŏn). An element found pure, as in the diamond, but also in many compounds. (p. 57)

CARBON DIOXIDE (dī-ŏk′sīd). A heavy gas given off from the lungs of animals or from decaying matter. It furnishes food for plants. (p. 51)

CARBON MONOXIDE (mŏn-ŏk′sīd). A colorless, very poisonous, odorless gas. (p. 126)

CATHARTIC (kȧ-thär′tĭk). A medicine which is used to cause a violent bowel movement. (p. 101)

CAVITY. A hollow place, such as the hole in a tooth from decay. (p. 151)

CELL. A tiny living bit. The body is built of a great number of cells. (p. 41)

CHEMICAL (kĕm′ĭ-kăl). Of or relating to chemistry, the science of the composition of substances and of their changes. Something obtained by or used in chemical work. (p. 4)

CHICKEN POX (chĭk′ĕn pŏks). A catching disease of childhood in which little blisters appear all over the body. (p. 8)

CHLORINE (klō′rēn). A chemical element usually in the form of a poisonous, greenish yellow gas, which kills bacteria quickly. (p. 57)

CHLOROMYCETIN (klō′rō-mī′sĕt-ĭn). A drug which is used to cure infections, such as typhoid fever. (p. 218)

CHOLERA (kŏl′ēr-ȧ). An infectious disease of the digestive tract. which comes on quickly and often causes death. (p. 203)

CIRCULATORY (sûr′kū-lȧ-tō′rĭ). Of or pertaining to the heart, arteries, capillaries, and veins, working together. (p. 54)

CITRIC ACID (sĭt′rĭk ăs′ĭd). An acid found in lemons, currants, and other fruits. (p. 166)

CONCENTRATED (kŏn′sĕn-trā′tĕd). Increased in strength by diminishing bulk or by purifying; condensed. (p. 52)

CONSERVATION (kŏn′sẽr-vā′shŭn). Saving or storing; building a supply for later use. (p. 189)

CONSTIPATION (kŏn′stĭ-pā′shŭn). A disturbance of the bowels, or intestines. Waste material is difficult to eliminate and collects in the intestines. (p. 128)

CONSTITUENT (kŏn-stĭt′ū-ĕnt). An element; a part; an ingredient. (p. 60)

CONSUMER (kŏn-sūm′ẽr). One who uses things or spends something. The word is used much like *buyer* or *shopper*. (p. 181)

COPPER. A reddish metallic element. Small amounts are found in certain foods. (p. 57)

CULTURE (kŭl′tūr). A growing of microorganisms for scientific study or medical use. (p. 202)

CULTURE MEDIUM (mē′dĭ-ŭm). The substance in which bacteria are grown for scientific study or medical use. (p. 219)

DDT. A substance to kill insects, used during World War II to prevent malaria and typhus fever. Used now at home and in camps. (p. 193)

DEFICIENCY (dē-fĭsh′ĕn-sĭ). A lack of some element of completeness. (p. 137)

DEGENERATION (dē′jĕn-ẽr-ā′shŭn). That condition of a tissue or an organ in which its vitality, or strength, has become lessened. (p. 73)

DIARRHEA (dī′ȧ-rē′ȧ). A disease in which the bowels move more frequently than usual. (p. 137)

DIGESTION (dĭ-jĕs′chŭn). The process by which food is changed into forms in which it can be used by the body. (p. 71)

DIGESTIVE (dĭ-jĕs′tĭv). Having to do with the process by which food is changed into forms in which it can be used by the body. (p. 17)

DIPHTHERIA (dĭf-thēr′ĭ-ȧ). An acute communicable disease in which whitish membranes are formed on the lining of the throat and other respiratory passages. (p. 6)

DYSENTERY (dĭs′ĕn-tĕr′ĭ). A disease of the intestinal tract marked by diarrhea. (p. 203)

ELEMENT (ĕl′ē-mĕnt). A substance which cannot be separated into other substances by chemical processes. (p. 41)

ELIMINATION (ē-lĭm′ĭ-nā′shŭn). Act of sending out or expelling from the body. (p. 71)

EMOTIONAL (ē-mō′shŭn-ăl). Expressing strong feeling. (p. 92)

EPITHELIAL (ĕp′ĭ-thē′lĭ-ăl). Of the epithelium, meaning the outer (skin) covering or inner lining of the body. (p. 55)

ESSENTIAL (ĕ-sĕn′shăl). Most important; absolutely necessary. (p. 41)

EXCESS. That which is beyond the limit of what is needed. (p. 45)

EXCRETION (ĕks-krē′shŭn). The process of getting rid of waste or harmful material from the blood or tissues. (p. 72)

EXCRETORY (ĕks′krē-tō′rĭ). Referring to the organs that get rid of waste or harmful material from the body. The kidneys are important parts of the excretory system. (p. 85)

FATIGUE (fȧ-tēg′). Weariness or loss of power from work or play. (p. 42)

FIBROUS (fī′brŭs). Consisting of or similar to hairlike fibers. (p. 128)

FILTER (fĭl′tẽr). To pass a liquid through material which will strain and clean it. (p. 77)

FLABBY (flăb′ĭ). Lacking in firmness; weak. (p. 91)

FLUOROSCOPE (floo′ō-rō-skōp). A machine useful in looking at inside parts of the body, such as the lungs. (p. 191)

FOCI OF INFECTION (fō'sī ĭn-fĕk'shŭn). Places in the body where bacteria are gathered in large numbers. (p. 43)

GENERATION (jĕn'ẽr-ā'shŭn). The average lifetime of man or animal. (p. 59)

GLAND. An organ of the body that secretes some useful fluid. (p. 99)

GOITER (goi'tẽr). Enlargement of the thyroid gland. (p. 64)

GRAHAM. A name given to flour made of the whole-wheat grain or to the bread made of that flour. (p. 16)

GRAM. The unit of weight in the metric system. About 28.35 grams make an ounce. (p. 59)

HEALTH EXAMINATION. A thorough testing of the parts and work of the body to determine its condition. (p. 4)

HEREDITY (hē-rĕd'ĭ-tĭ). The passing on of likenesses from parents to children. (p. 53)

HOOKWORM DISEASE (ho͝ok'wûrm' dĭ-zēz'). A disease caused by small hookworms, which suck blood from the intestinal walls. (p. 187)

HYDROGEN (hī'drō-jĕn). A gas which combines with oxygen to form water. (p. 57)

HYGIENE (hī'jēn). The science of living healthfully. (p. 190)

IMMUNE (ĭ-mūn'). Protected against some disease by substances in the blood that make certain bacteria and their poisons harmless. (p. 208)

IMMUNITY (ĭ-mū'nĭ-tĭ). Freedom from and high resistance to a certain disease. (p. 198)

IMMUNIZATION (ĭm'ū-nī-zā'shŭn). The act of being made immune against a certain disease. (p. 6)

INDIGESTION (ĭn'dĭ-jĕs'chŭn). Poor digestion; discomfort during any part of the process of digestion. (p. 191)

INFANTILE PARALYSIS (ĭn'făn-tīl pȧ-răl'ĭ-sĭs). An acute disease that comes mostly to babies and children. It spreads widely and often causes injury for life. (p. 217)

INFECTED (ĭn-fĕk'tĕd). Contaminated with any disease-producing thing. (p. 192)

INFECTIOUS (ĭn-fĕk'shŭs). Communicable; caused by germs. (p. 187)

INFLAMMATION (ĭn-flă-mā'shŭn). A condition in which there is redness, swelling, and often pain. (p. 73)

INFLUENZA (ĭn'flo͞o-ĕn'zȧ). A communicable disease of the respiratory system. (p. 208)

INHERIT (ĭn-hĕr′ĭt). To receive by birth. (p. 91)
INJECT (ĭn-jĕkt′). To put or force in. (p. 149)
INJECTION (ĭn-jĕk′shŭn). A liquid, usually a medicine, forced into the body. (p. 7)
INSANITARY (ĭn-săn′ĭ-tĕr′ĭ). Not sanitary; unhealthful. (p. 170)
INTESTINAL (ĭn-tĕs′tĭ-năl). Of or relating to the intestines. (p. 220)
INTESTINES (ĭn-tĕs′tĭnz). The bowels; the tubelike part of the digestive tract beginning below the stomach. (p. 54)
IODINE (ī′ô-dīn). A chemical substance. One of the important elements in the thyroid secretion. (p. 19)
IRON. A silver-white metallic element. Iron is necessary in a healthful diet. (p. 49)
IRRADIATED (ĭ-rā′dĭ-āt′ĕd). Treated with ultraviolet or other rays. (p. 143)

KIDNEY (kĭd′nĭ). One of a pair of organs located in the abdomen near the spinal column, which remove poisonous and unnecessary substances from the blood. (p. 71)

LARYNGITIS (lăr′ĭn-jī′tĭs). Inflammation of the mucous membrane of the larynx. (p. 211)

MAGNESIUM (măg-nē′zhĭ-ŭm). A metallic element that in various compounds makes up part of the body. (p. 57)
MALARIA (mȧ-lâr′ĭ-ȧ). A disease due to a microorganism in which the patient has attacks of fever at regular intervals. (p. 149)
MALNOURISHED (măl-nûr′ĭsht). Poorly nourished. (p. 94)
MALNUTRITION (măl′nū-trĭsh′ŭn). Poor nutrition. (p. 91)
MARROW (măr′ō). A soft substance which fills the cavities of many bones. (p. 128)
MEASLES (mē′z'lz). A communicable disease in which the skin all over the body breaks out and the person has a fever. (p. 8)
MENU (mĕn′ū). A list of foods served in a meal; a bill of fare. (p. 117)
MICROORGANISM (mī′krô-ôr′găn-ĭz'm). A plant or an animal so small that it can be seen only under the microscope. (p. 219)
MICROSCOPE (mī′krô-skōp). An instrument which makes an object put under its lens look many times larger than it really is. (p. 52)
MICROSCOPIC (mī′krô-skŏp′ĭk). Capable of being seen only under a microscope. (p. 53)

MILLIGRAM (mĭl'ĭ-grăm). One thousandth of a gram. Abbreviation *mg*. (p. 146)

MINERAL. The part of food which is left as ashes after the food is burned. It is useful in the building of bone material. (p. 52)

NIACIN (nī'*ȧ*-sĭn). One of the B vitamin family important in the prevention of pellagra. It is also called nicotinic acid. (p. 148)

NICOTINIC ACID (nĭk'ō-tĭn'ĭk ăs'ĭd). Niacin. (p. 148)

NITROGEN (nī'trō-jĕn). A colorless, odorless gas; one of the chemical elements of which proteins are built. (p. 51)

NUCLEUS (nū'klē-*ŭ*s). The central part of most cells. It contains a peculiar type of protein known as *chromatin*, through which inherited characteristics are passed on. (p. 53)

NUTRITION (nū-trĭsh'*ŭ*n). The process of supplying the body with whatever foods contribute to growth and development. (p. 91)

OBESITY (ō-bēs'ĭ-tĭ). The state of being very fat. (p. 100)

ORGAN (ôr'g*ă*n). A part of the body or group of tissues that performs special, important duties. (p. 54)

OXYGEN (ŏk'sĭ-jĕn). A gas having no color, no odor, no taste. It is part of the air and is necessary for life. (p. 51)

PASTEURIZATION (păs'tēr-ĭ-zā'sh*ŭ*n). A process invented by the great French scientist Pasteur for preventing or checking the growth of bacteria in liquids. (p. 195)

PASTEURIZE (păs'tēr-īz). To kill or check the growth of bacteria in milk and other liquids by heating them to about 145° F. for thirty minutes. (p. 158)

PELLAGRA (pĕ-lāg'r*ȧ*). A disease due to poor nutrition in which the skin often breaks out and the nervous and digestive systems are affected. (p. 148)

PENICILLIN (pĕn-ĭ-sĭl'ĭn). An important medicine used to kill certain germs within the body. It is made from a mold. (p. 208)

PERSPIRATION (pûr'spĭ-rā'sh*ŭ*n). Sweat; a salty, watery liquid secreted by the sweat glands and oozing from the skin. (p. 75)

PHOSPHORIC ACID (fŏs-fŏr'ĭk ăs'ĭd). An acid, found in some soft drinks, that may harm the teeth. (p. 166)

PHOSPHORUS (fŏs'fō-r*ŭ*s). An element which in various compounds is an essential part of the cells of teeth and bones and all other body cells. (p. 49)

PHYSICAL DEFECT. Fault or imperfection in some part of the body. (p. 6)

PHYSIOLOGY (fĭz′ĭ-ŏl′ō-jĭ). The study of the processes or changes that go on in living animals and plants. (p. 66)

PITUITARY GLAND (pĭ-tū′ĭ-tĕr′ĭ). A small, oval gland located just below the brain. (p. 99)

PNEUMONIA (nū-mō′nĭ-ȧ). A disease in which there is a serious inflammation of the lungs. (p. 9)

POLIO (see Infantile Paralysis)

POLLUTION (pŏ-lū′shŭn). A making unclean and unhealthful, as the pollution of water. (p. 78)

POSTURE (pŏs′tūr). The position in which a person sits, stands, or walks. (p. 73)

POTASSIUM (pō-tăs′ĭ-ŭm). A soft, light metallic element that is always found as a compound with some other substance. (p. 57)

PROTEIN (prō′tē-ĭn). A food substance especially abundant in white of egg, cheese, and lean meat. (p. 58)

PROTOPLASM (prō′tō-plăz′m). Living matter of cells. (p. 52)

PYORRHEA (pī′ō-rē′ȧ). A disease of the gums in which there is usually a discharge of pus and the teeth often become loose. (p. 152)

RABIES (rā′bĭ-ēz). A disease caused by the bite of a mad dog; hydrophobia. (p. 218)

RADIUM (rā′dĭ-ŭm). An element used in the treatment of disease, especially cancer. (p. 215)

RESISTANCE (rē-zĭs′tăns). Ability to resist bacteria, infections, and fatigue. (p. 6)

RESPIRATORY (rē-spīr′ȧ-tō′rĭ). Of or pertaining to the act of breathing. (p. 54)

RHEUMATIC FEVER (rōō-măt′ĭk fē′vēr). An acute disease, usually in children and young people, which may cause pain in and around the joints and harm the heart. (p. 214)

RIBOFLAVIN (rī′bō-flā′vĭn). One of the vitamin B family. Lack of riboflavin affects the eyes and may affect the legs and mouth. (p. 147)

RICKETS (rĭk′ĕts). A bone disease usually affecting children and caused by a poor diet. (p. 141)

RINGWORM (rĭng′wûrm′). A skin disease. Athlete's foot is a common form. (p. 259)

SAFETY ZONE. A place marked off for people to wait for streetcars or buses without being in the way of traffic. (p. 271)

SALIVA (sȧ-lī′vȧ). The watery fluid secreted by the glands of the mouth. (p. 93)

SALIVARY GLAND (săl'ĭ-vĕr'ĭ). A gland that produces saliva. (p. 99)

SANATORIUM (săn'ȧ-tō'rĭ-ŭm). A resort or retreat to which the sick go for treatment. (p. 205)

SANITARY (săn'ĭ-tĕr'ĭ). Of or pertaining to health; hygienic. (p. 41)

SCARLET FEVER. A serious contagious disease in which the throat is sore, the skin has a bright red rash, and there is a fever. (p. 8)

SCIENTIST (sī'ĕn-tĭst). A person who knows a great deal about science. (p. 55)

SCURVY (skûr'vĭ). A disease due to poor nutrition in which the gums often become sore and bleeding, there is usually loss in weight, and communicable diseases are caught more easily. (p. 151)

SECRETE (sē-krēt'). To discharge from gland cells a special substance made from material taken from the blood. (p. 99)

SERUM (sēr'ŭm). The watery part of the blood that is left after the blood has clotted. Immune serum may be used for inoculation purposes. (p. 208)

SLEEPING SICKNESS (slēp'ĭng sĭk'nĕs). A serious fever that makes the patient weak, tired, and thin. (p. 218)

SMALLPOX (smôl'pŏks'). A very contagious disease which may leave ugly marks on the skin. (p. 7)

SODIUM (sō'dĭ-ŭm). A soft, silver-white metallic element that occurs in many common compounds. Salt is a compound containing sodium. (p. 57)

SOLUBLE (sŏl'ū-b'l). Able to be dissolved in a liquid. (p. 72)

SOLVENT (sŏl'vĕnt). A substance (usually liquid) able to dissolve certain substances. (p. 72)

SPORE (spōr). A kind of one-celled plant or animal capable of growing into a new plant or animal. (p. 260)

SPRAIN (sprān). To injure a joint by a sudden and severe twist. (p. 5)

SPUTUM (spū'tŭm). Mucus from the throat, lungs, or nose, often mixed with saliva. (p. 192)

STETHOSCOPE (stĕth'ō-skōp). An instrument used to hear sounds within the chest. (p. 200)

STIMULATE (stĭm'ū-lāt). To excite to activity; to spur on. (p. 73)

STREPTOMYCIN (strĕp'tō-mī'sĭn). A new drug useful against bacteria that live in the intestine. (p. 218)

SULFA DRUG (sŭl'fȧ drŭg). One of some widely used medicines that kill the growth of certain germs. (p. 10)

SULPHUR (sŭl'fẽr). An element, not metallic, that is found alone or in compounds. Sometimes it looks like yellow powder. (p. 57)

SUSCEPTIBILITY (sŭ-sĕp'tĭ-bĭl'ĭ-tĭ). Sensitiveness; liability to get a certain disease. (p. 190)

SYSTEM (sĭs'tĕm). A number of organs working together for one purpose, as the digestive system, the circulatory system. (p. 54)

TENDENCY (tĕn'dĕn-sĭ). Movement or inclination in a particular direction. (p. 91)

TERRAMYCIN (tĕr'ȧ-mī'sĭn). A drug that is used in treating infections, such as typhoid fever. (p. 218)

TETANUS (tĕt'ȧ-nŭs). A painful, often fatal, disease caused by one kind of bacterium and marked by continuous, uncontrolled contractions of certain muscles; also called lockjaw. (p. 18)

THIAMIN (thī'ȧ-mĭn). Vitamin B_1. Lack of thiamin affects the growth, appetite, and nerves. (p. 131)

THYROID GLAND (thī'roid). A large gland that lies close to the larynx (voice box) in the neck. (p. 64)

TINCTURE (tĭngk'tûr). A solution of a medicinal substance, usually in alcohol. (p. 64)

TISSUE (tĭsh'ū). A collection or mass of similar cells which perform a similar activity. (p. 54)

TONSIL (tŏn'sĭl). One of a pair of spongy growths at the back of the mouth. (p. 10)

TOXOID (tŏk'soid). A form of weakened toxin used very successfully with babies less than a year old and with young children, in place of toxin-antitoxin, to prevent them from getting diphtheria. (p. 7)

TUBERCLE (tū'bẽr-k'l). A small, rounded growth produced by disease, especially in tuberculosis. (p. 190)

TUBERCULIN (tū-bûr'kū-lĭn). A sterile liquid containing the growth products and proteins of the tubercle bacillus. (p. 197)

TUBERCULOSIS (tū-bûr'kū-lō'sĭs). A communicable disease caused by the tubercle bacillus. (p. 187)

TYPHOID FEVER (tī'foid). A very serious disease caused by a certain kind of bacterium (the typhoid bacillus), usually carried by food or drink. (p. 6)

ULTRAVIOLET RAY (ŭl'trȧ-vī'ō-lĕt). Invisible ray of light beyond the violet rays of the spectrum of sunlight. (p. 143)

URINATE (ū'rĭ-nāt). To discharge urine; to "make water." (p. 75)

URINE (ū'rĭn). A fluid excreted from the kidneys. (p. 73)

URINE ANALYSIS (ȧ-năl′ĭ-sĭs). A test to determine the substances that may be in urine. (p. 74)

VACCINATE (văk′sĭ-nāt). To inject a substance into the body to prevent one of certain diseases. For example, smallpox is prevented by injecting a small amount of the smallpox virus, which will cause the body to produce substances that protect the person from smallpox. (p. 7)

VACCINATION (văk′sĭ-nā′shŭn). Preventing smallpox by injecting a small amount of the smallpox virus. (p. 6)

VACCINE (văk′sēn). Weakened germs, extracts of germs, or killed germs of a certain kind which can be put into the body to protect it against any of certain diseases, as smallpox. (p. 18)

VIRUS (vī′rŭs). A very small germ found growing in a person or in an animal suffering from one of certain kinds of diseases. (p. 208)

VITAMIN (vī′tȧ-mĭn). Substance in food necessary for growth and health. (p. 61)

WATER GLASS. A substance that can be dissolved in water to form a jellylike material. It can be used to keep eggs for winter use. (p. 175)

WHOOPING COUGH (hōōp′ĭng kôf). A disease that is spread from person to person, especially among children. The patient coughs violently. (p. 8)

X RAY. Ray which can pass through many substances which light rays cannot pass through. (p. 18)

YELLOW FEVER. A disease caused by a microorganism carried by a certain kind of mosquito. (p. 149)

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